MOONS'

moving in better ways





Stepper Products

General Catalogue

Integrated Step–Servo Motor
Step–Servo Motor & Driver
Integrated Stepper Motor
Stepper Driver
Stepper Motor

Dawn of MOONS' 3A Era

1st A Motion Products & Motion Control Products for Manufacturing Automation

MOONS' is a leading manufacturer of the key parts, components and system level products used in manufacturing automation including: Stepper Motor and Drive, Brushless Motor and Drive, AC Servo Motor and Drive, Integrated solutions. We continue to play a major role in the manufacturing automation field with us moving forward to being a system level provider of total motion control solutions.

2nd A Intelligent LED Driver & Control Technologies for LED Lighting Management Automation

3rd A Online Asset Monitoring, Fault Detection and Diagnosis Solutions for EAM Automation

MOONS' Business Philosophies

● Customer satisfaction

MOONS' aims to enhance customer satisfaction through the provision development of innovative solutions, manufacture of high quality products, and ontime delivery and outstanding customer support.

● Employee satisfaction

MOONS' values and respects our employees input and encourages them to grow together with the company.
We have been working to develop tools and trainings to build a thriving culture of excellence internally to support the future growth of our employees and the company.

● Partnership

MOONS' strongly believes in a true integrated partnership between all partners in business including customers, distributors and all these in supply chain. As a result of our this philosophy, we endeavor to provide the best value contribution to all partners, which can help our partners improve their competiveness to achieve the win-win situation.

Worldwide service map


moving in better ways

To demostrate our commitment to our community and our customers, **MOONS'** has adopted as our official slogan: "Moving in Better Ways". These words have following meanings to **MOONS':**

- **MOONS'** is an excellent global manufacturer of control motor & control motor drive system
- **MOONS'** is a leading global supplier of intelligent LED lighting control system and drive solutions
- **MOONS'** is a well-recognized reliable provider of system solutions for the intelligent system management in large asset-intensive industrial enterprises

We provide superior motion control systems to our global customers through optimizing of product design, engineering, and manufacturing. This is done by strengthening process and quality control and constantly creating solutions using motion control products that are more energy efficient and environmental friendly.
We provide leading-edge LED lighting drivers, controls and management solutions. Our leading lighting control technology makes the drive professional, convenient to use, and more energy efficient in reducing costs and enhancing profits for global customers.
We provide management system solutions for large asset-intensive industries including power generation, petrochemical, metallurgy, coal and large scale agriculture.

- **We are an ambitious and enterprising company**

MOONS' never stops the on-going accelerated pace to improve processes and increase efficiency. Through scientific management methodologies and tools and incorporating advanced technology with senior management experience, we constantly optimize management processes that enable **MOONS'** to maintain on-going growth in competitive markets.

- **We are a cooperative and thriving group**

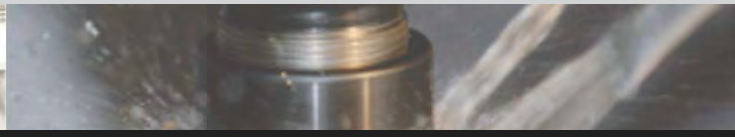
All members of our team are able to incorporate the concept of moving in better ways during work, they continually upgrade our collective values, and strive for excellence in the process of doing business to improve expertise and gain better opportunities.

Motion Control Products and Solutions

MOONS' provides a wide range of motion control products and solutions serving the fields of printing, intelligent stage lighting, textile machinery, consumer appliance, banking equipment, factory automation, electronics, semiconductor equipment, packaging machinery, medical equipment and measuring equipment, to name a few.

Entering into the hybrid stepper motor business in 1997, **MOONS'** has grown to where it is now one of the top 5 global manufacturers of stepper motors, and an integrated provider of related motion control products and solutions.

MOONS' has been and is concentrating on technological advancement, product design innovation and improvement for standard and customized motion control products and solutions. Cutting edge technologies, product improvement and scientifically proven management systems permit **MOONS'** to exceed customers' requirements around the world. **MOONS'** supports our growing customer base by providing exceptional quality, application engineering, rapid prototyping, regional warehousing and competitive pricing.

Introduction to Stepper Motors

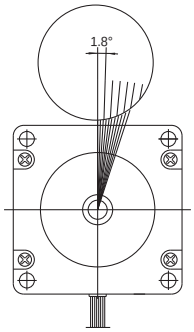
A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence.

Stepper motors are the easiest devices for precise positioning control. They are wildly being used in various application for position and speed via all kinds of control signals such as digital, analog, communication etc.

■ Features

◇ Precise Positioning Control

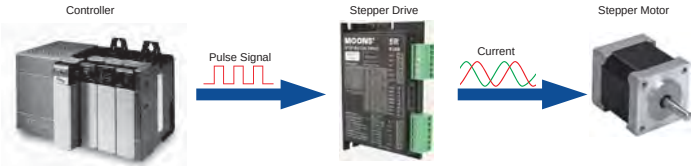
A stepper motor rotates with a fixed step angle, just like the second hand of a clock. This angle is called "basic step angle." MOONS' offers several types of "basic step angle" as standard motors: 2-phase stepping motors with a basic step angle of 0.9° and 1.8° and 3-phase stepping motors with a basic step angle of 1.2°.
Besides the standard motor, MOONS' also has stepper motors avalible with other "basic step angle." They are 0.72°, 1.5°, 3.6° and 3.75°, these motors are not listed in this catalogue, please contact MOONS' for details.



2 phase stepper motor

◇ Easy Control with Pulse Signals

A system configuration for high accuracy positioning is shown below. The rotation angle and speed of the stepping motor can be controlled accurately using pulse signals from the controller.

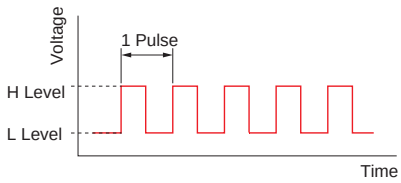


▪ What is a Pulse Signal?

A pulse signal is an electrical signal whose voltage level changes repeatedly between ON and OFF.

Each ON/OFF cycle is counted as one pulse. A command with one pulse causes the motor output shaft to turn by one step.

The signal levels corresponding to voltage ON and OFF conditions are referred to as "H" and "L," respectively.

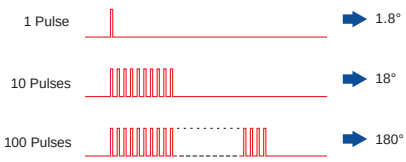


▪ The length of Rotation is Proportional to the Number of Pulses

The length of rotation of the stepping motor is proportional to the number of pulse signal (pulse number) given to the driver.

The relationship of the stepper motor's rotation (rotation angle of the motor output shaft) and pulse number is expressed as follows:

$\theta = \theta s \times A$ (θ: Rotation angle of the motor output shaft [deg]; θs : Step angle [deg/step]; A : Pulse number [pulses])

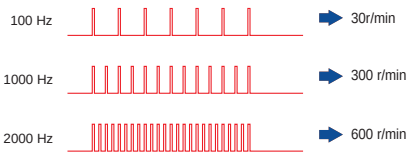


▪ The Speed is Proportional to the Pulse Frequency

The speed of the stepper motor is proportional to the frequency of pulse signals given to the driver.

The relationship of the pulse frequency [Hz] and motor speed [r/min] is expressed as follows:

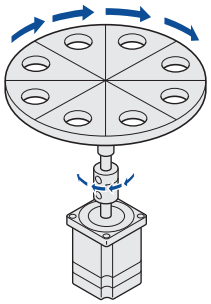
$N = \frac{\theta s}{360} \times f \times 60$ (N : Speed of the motor output shaft [r/min]; θs : Step angle [deg/step]; f : Pulse frequency [Hz] (Number of pulses input per second))



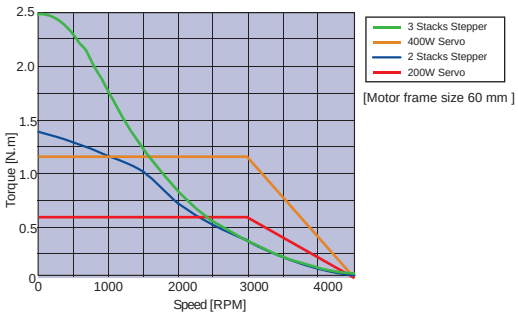
◇ Generating High Torque with a Compact Size

Stepper motors generate high torque with a compact size.
These features give them excellent acceleration and response, which in turn makes these motors well-suited for torque-demanding applications where the motor must be started and stopped frequently.
To meet the need for greater torque at low speed, MOONS' also has geared motors option.

- Frequent Starting/Stopping is Possible

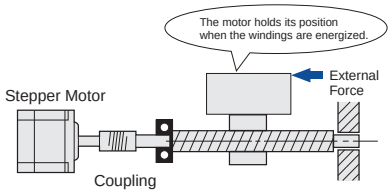


- Speed VS Torque Characteristics comparetion between servo and stepper with same motor size.



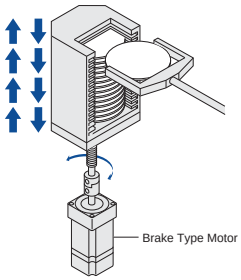
◇ The Motor Holds Itself at a Stopped Position

Stepper motor has full torque at stand-still as long as the windings are energized. This means that the motor can be held at a stopped position without using a mechanical brake.



◇ Motor with Electromagnetic Brake

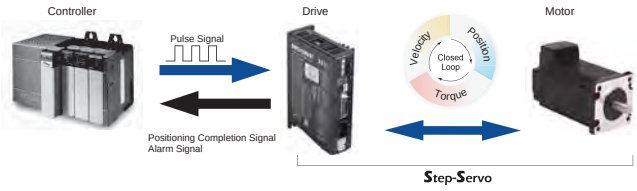
Once the power is cut off, the self-holding torque of the motor is lost and the motor can no longer be held at the stopped position in vertical operations or when an external force is applied. In lift and similar applications, an electromagnetic brake type motor is required.



◇ Closed Loop Servo Control Stepper Motors

Step-Servo

The **Step-Servo** is an innovative revolution for the world of stepping motor, it enhances the stepping motor with servo technology to create a product with exceptional feature and broad capability.
The **Step-Servo** greatly improves the performance to be much more Intelligent, Efficient, Compact, Accurate, Fast and Smooth.



Stepper Motor Category

Stepper motors come in different types including the basic type, encoder type, IP65 type, Integrated type with drive and controller, brake type and geared type. The availability of all options can also be combined together as the most optimize and compact motion control unit, for example, MOONS' can offer encoder and geared type, IP65 integrated with drive, controller and encoder, all combinations are avalible per request.

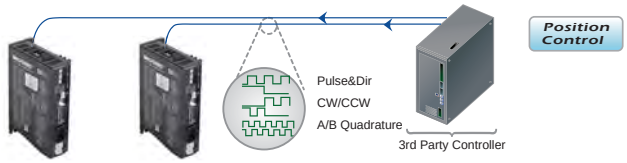
◇ Basic Type A basic model that is easy to use and designed with a balanced set of functions and characteristics.	
◇ Encoder Type Encoder type stepper gives the possiblity for closed loop control, encoder feedback signals can be used for position verification and enhanced performance as stall detection and stall prevension depending on the features of the drive.	
◇ IP65 Type IP65 type stepper motors with the feature of dust proof and resistant to low pressure water jets, are ideal for applications in wet factory environments such as the food and beverage industry or outdoor use. IP65 specifies a product that is dust tight (no ingress of dust; complete protection against contact) and protected against water jets (water projected by a nozzle from any direction shall have no harmful effects).	
◇ Integrated Type with Drive and Controller Integrated stepper motors offer a space-saving design that reduces wiring and saves on cost over separate motor and drive components. For controller type, you only need cable connection for Power and necessory communication or sensor depending on application, it also cost for host controller and make it easy for you to setup sofiscated motion control system.	
◇ Brake Type These motors incorporate a non-excitation type electromagnetic brake. When the power is accidentally cut off due to power outage or other unexpected event, the electromagnetic brake holds the load in position to prevent it from dropping or moving. Brake type steppers are wildly used in vertical axis application.	
◇ Geared Type These motors incorporate a dedicated position-control gearhead with reduced backlash to make the most of the high controllability of the motors. The gearhead ensures highly accurate, smooth operation even in applications where a large torque is received.	

■ Control Modes for Drives

With MOONS' advanced stepper drive technology, each stepper motor can be operated under various control modes as position control, velocity control or torque control. MOONS' stepper drive accepts all types of control signals including digial, analog and Industrial network communications. Built-in controller Q drive supports stand alone operation for single axis motion by stored sofiscated program execution.

◇ Pulse Control

Pulse control is a traditional way to command a stepper motor in position and velocity control.
The length of rotation is proportional to the number of pulses as well as the speed is proportional to the pulse frequency.



Pulse Control

Three most popular pulse control digital signal types are Pulse & Direction, CW/CCW Pulse and A/B Quadrature.

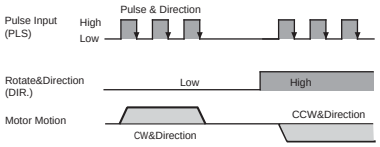
- Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via MOONS' software.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction.

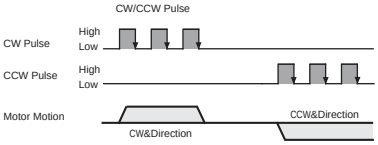


- CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in One direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

*Direction definition can be configured via MOONS' software.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction.

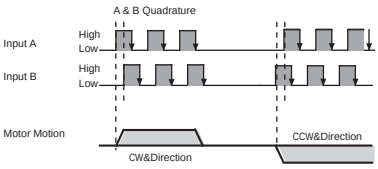


- A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder.

Direction definition can be configured via MOONS' software. Direction is determined via which channel leads the other.

The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.



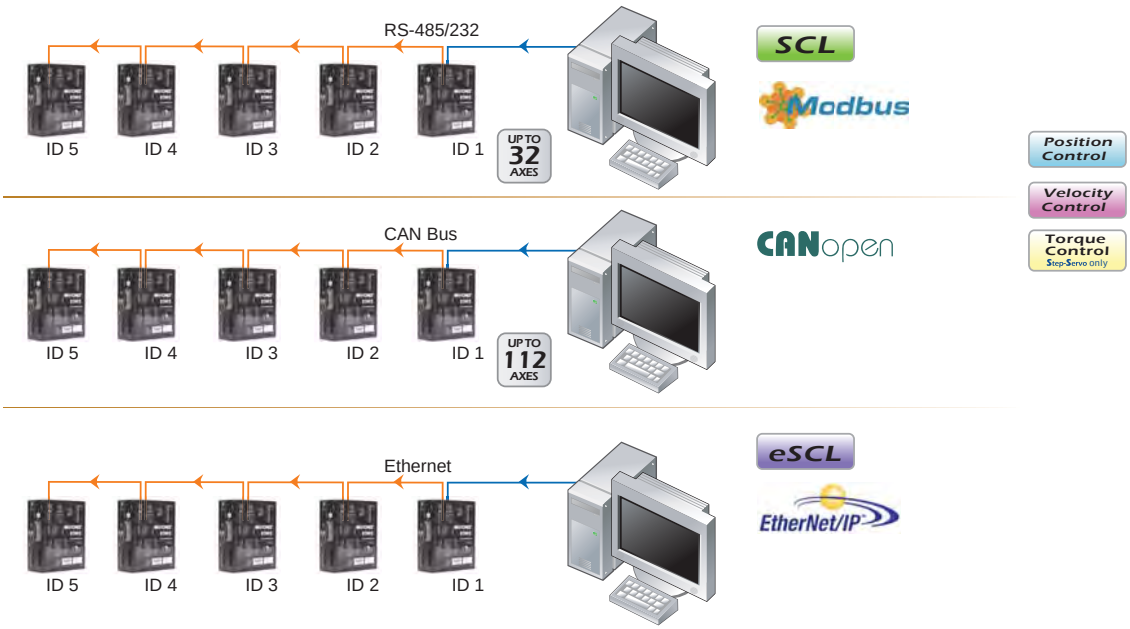
◇ Analog Control

MOONS' stepper drive has the ability to accept analog signal for position and analog control, **Step-Servo** can also use analog signal for torque control.

Analog Control

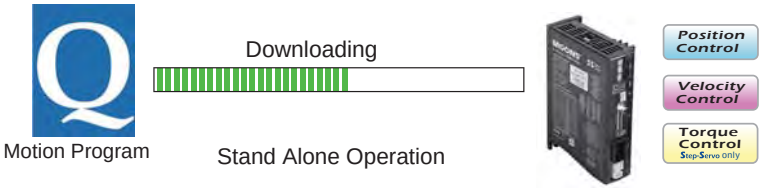
◇ Field Bus Control

MOONS' stepper drive supports all popular Industrial network communications including RS-485, Modbus, CAN and Ethernet.



◇ Stand Alone Operation

MOONS' Built-in controller Q drive supports stand alone operation for single axis motion by stored sofiscated program execution. It has the ability to run up to 744 lines of stored Q program in non-volatile memory. Q programs are created using the Q Programmer software, which provides multi-tasking, math calculations using analog and digital parameters, conditional processing, data register manipulation, and more features in a robust yet simple text-based programming language.



■ Overview of MOONS' Stepper Products

◇ Closed Loop Step-Servo

TSM Series - Integrated Step-Servo

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical): 12-48VDC/12-70VDC
Encoder: Incremental 20000 counts/rev
Enhanced Intelligence:
- Automatic load inertia detection
- Extended homing and software limit
- Built-in position table up to 63 points

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control, Daisy Chain
- Stand alone operation

Inputs and Outputs:
- P Type- 4 Digital Inputs, 3 Digital Outputs, Encoder Outputs
- S/Q/C Type- 8 Digital Inputs, 4 Digital Outputs, 1 Analog Input

Communication:

Position Control | Velocity Control | Torque Control

SSM Series - Integrated Step-Servo

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical): 12-48VDC/12-70VDC
Encoder: Incremental 20000 counts/rev
Easy Wiring with Spring Connectors
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- S/Q Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 3 Digital Inputs, 1 Digital Output

Communication:

Position Control | Velocity Control | Torque Control

TXM Series - IP65 Type Integrated Step-Servo

Frame Size: 60mm
Input Voltage(Typical): 12-70VDC
Encoder: Incremental 20000 counts/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 5 Digital Inputs, 3 Digital Outputs

Communication:

Position Control | Velocity Control | Torque Control

SS Series - Step-Servo Motor & Drive Package

Motor Frame Size: 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): 24-75VDC
Encoder: Incremental 20000 counts/rev
Enhanced Intelligence:
- Automatic load inertia detection and switch set stiffness
- Extended homing and software limit
- Built-in position table up to 63 points

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- P/R Type- 6 Digital Inputs, 2 Digital Outputs, Encoder Outputs
- S/Q/C Type- 8 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs

Communication:

Position Control | Velocity Control | Torque Control

◇ Integrated Stepper Motor

STM-R Series - Pluse Input Type Integrated Stepper Motor

Position Control

Frame Size: 42mm, 56mm
Input Voltage(Typical): 12-48VDC/12-70VDC
Encoder Option: Incremental 4000 counts/rev
Microstep Resolution: Switch set, up to 25600 steps/rev
Control Modes:
- Pulse Control

Inputs and Output:
- 3 Digital Inputs, 1 Digital Output

CE RoHS Compliant

STM Series - Controller Type Integrated Stepper Motor

Position Control
Velocity Control

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical):
- STM17 - 12-48VDC
- STM23/24 - 12-70VDC

Encoder: Incremental 40000 counts/rev
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- SF/QF Type- 4 Configurable digital Inputs/Outputs, 1 Analog Input
- S/Q/IP Type- 3 Digital Inputs，1Digital Output，1 Analog Input
- C Type- 3 Digital Inputs, 1 Digital Output

CE RoHS Compliant

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

SWM Series - IP65 Type Integrated Stepper Motor

Position Control
Velocity Control

Frame Size: 60mm
Input Voltage(Typical): 12-70VDC
Encoder: Incremental 4000 counts/rev
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 5 Digital Inputs, 3 Digital Outputs

CE RoHS Compliant

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

◇ Two Phase Stepper Drive

SRAC Series - AC Input Stepper Drive

Input Voltage(Typical): AC120V/240V
Drive Output Current: Up to 8Amp(Peak of Sine)
Microstep Resolution: Switch set, up to 25600 steps/rev
Control Modes:
- Pulse Control

Inputs and Outputs:
- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size: 56mm, 60mm, 86mm

Position Control

CE RoHS Compliant

STAC Series - AC Input Controller Type Stepper Drive

Input Voltage(Typical): AC120V/240V
Drive Output Current: Up to 2.5Amp(Peak of Sine)
Encoder Option: Incremental
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- S/Q/C Type- 4 Digital Inputs, 2 Digital Outputs, 1 Analog Input
- Q-A/IP Type- 12 Digital Inputs, 6 Digital Outputs, 1 Analog Input

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

Supported Motor Frame Size: 56mm, 60mm, 86mm

Position Control
Velocity Control

CE RoHS Compliant UL

SR Series - DC Input Stepper Drive

Input Voltage(Typical): DC24V/48V
Drive Output Current: Up to 7.8Amp(Peak of Sine)
Microstep Resolution: Switch set, up to 51200 steps/rev
Control Modes:
- Pulse Control

Inputs and Outputs:
- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size:
- 28mm, 35mm, 42mm, 56mm, 60mm, 86mm

Position Control

CE RoHS Compliant

ST Series - DC Input Controller Type Stepper Drive

Input Voltage(Typical): DC24V/48V
Drive Output Current: Up to 10Amp(Peak of Sine)
Encoder Option: Incremental
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- S type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- Q/C/IP- 8 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

Supported Motor Frame Size:
- 28mm, 35mm, 42mm, 56mm, 60mm, 86mm

Position Control
Velocity Control

CE RoHS Compliant

◇ Three Phase Stepper Drive

AC Input Stepper Drive and DC Input Stepper Drive

Drive Input Voltage(Typical):
- AC120V/240V
- DC12-24V/24-75V

Control Modes:
- Pulse Control

Inputs and Outputs:
- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size: 60mm, 86mm

CE RoHS Compliant

◇ Stepper Motor

Standard Motors

2-Phase Basic Type

28mm 35mm 42mm 56mm 60mm 86mm

2-Phase PowerPlus Series Type

56mm

2-Phase IP65 Type

56mm 60mm 86mm

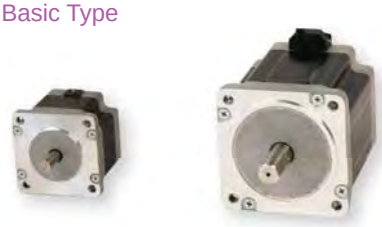
2-Phase Encoder Type

42mm 56mm 60mm 86mm

2-Phase Brake Type

47mm 60mm 86mm

3-Phase Basic Type



60mm 86mm

Stepper General Catalogue

Appendix		Accessories		Stepper Motor		3-Phase Stepper Drive		2-Phase Stepper Drive				Integrated Stepper Motor			Step-Servo				Step-Servo MOONS'
								DC Input		AC Input									
Glossary	Software	Cables	Power Supplies	3-Phase	2-Phase	DC Input	AC Input	With Controller **ST**	Pulse Input **SR**	With Controller **STAC**	Pulse Input **SRAC**	IP65 With Controller **SWM**	With Controller **STM**	Pulse Input **STM-R**	Motor & Drive **SS**	IP65 Integrated **TXM**	Integrated **SSM**	Integrated **TSM**	

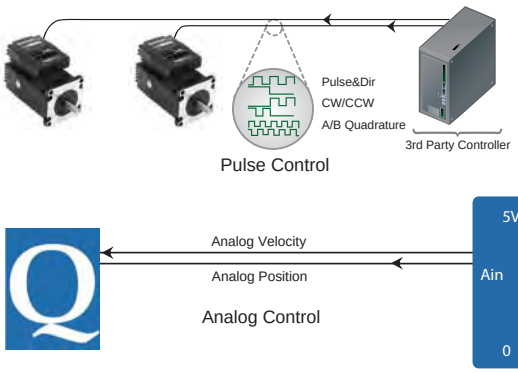
Step-Servo

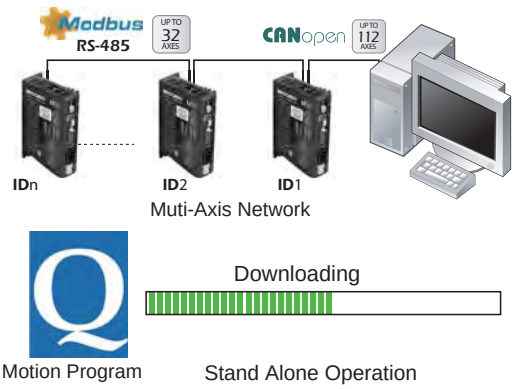
Closed Loop Step-Servo

The **Step-Servo** is an innovative revolution for the world of stepper motor, it enhances the stepper motors with servo technology to create a product with exceptional feature and broad capability.

Features

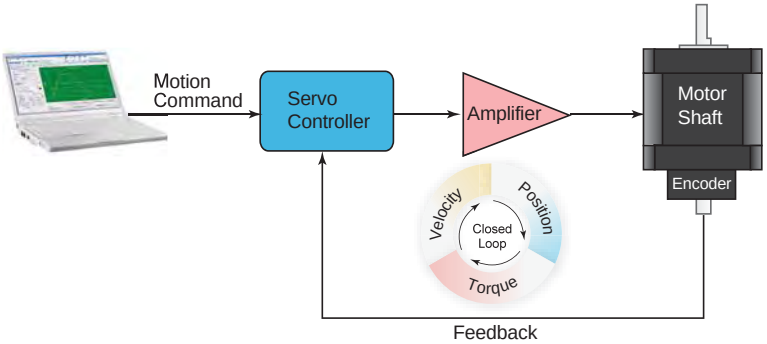
Multi-functional Capability





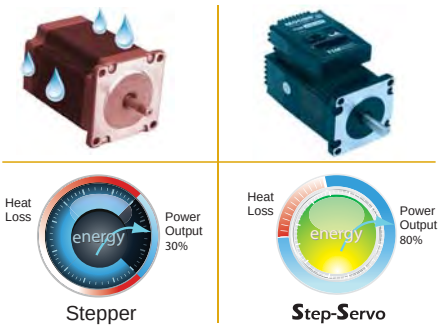
Closed Loop

- Very tight position and velocity control for the most demanding applications.
- Robust servo loops that tolerate wide fluctuation in load inertia and frictional loading.
- Precise positioning to within ±1 count (0.018°) using high resolution(20000 counts/rev) encoder.



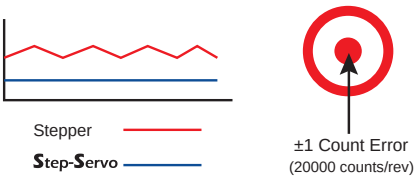
Low Heating/High Efficiency

- Uses only the current required by the application, generating minimum heat output.
- When stand-still, current can reach nearly zero for extremely low heat output.
- Being able to use almost 100% of torque, allows for more efficient and compact motor usage.

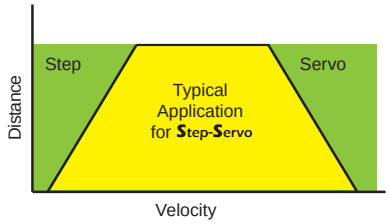


Smooth & Accurate

- Space vector current control with 5000 line high resolution encoder, gives smooth and quiet operation, especially at low speeds.
  ------A feature never found with traditional stepping motors
- High stiffness due to the nature of the stepping motor combined with the highly responsive servo control
  ------Accurate position control both while running and static positioning



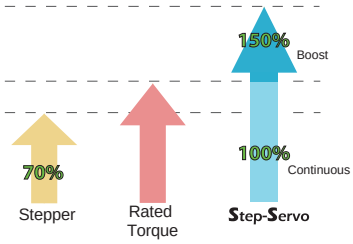
Fast Response



- When performing fast point-to-point moves, the high torque output and advanced servo control provides a very responsive system far exceeding what can be done with a conventional stepper system.

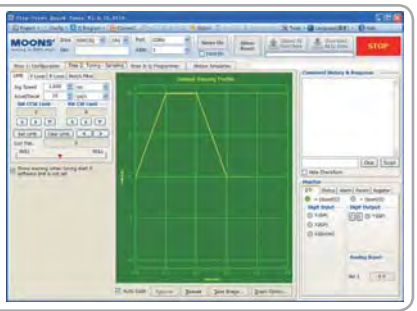
High Torque

- Because the **Step-Servo** operates in full servo mode, all the available torque of the motor can be used.
- The motor can provide as much as 50% more torque in many applications. High torque capability often eliminates the need for gear reduction.
- Boost torque capability can provide as much as 50% more torque for short, quick moves.

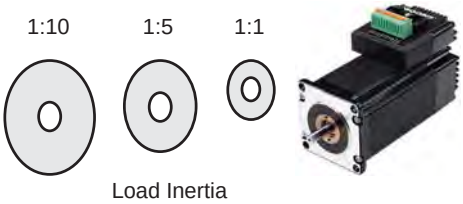


Motion Monitoring

- For difficult control situations where performing a precise move is necessary, the **Step-Servo** Quick Tuner provide an easy to use interface for performing and monitoring the motion profile.
- Many common parameters such as Actual Speed or Position Error can be monitored to evaluate system performance.
- The monitoring is interactive with the servo tuning capability so that optimum performance can be achieved.



Easy Tunning



- Pre-defined tuning parameters for maximum control performance and stability.
- Easy selection list provides the level of control desired.
- In most cases NO extra manual tuning is required.

PC Based Software

MOONS' **Step-Servo** products support following software application make it easy to configure, tuning, testing and evaluation.

- **Step-Servo** Quick Tuner
- Q Programmer
- RS485 Bus Utility
- CANopen Test Tool

Overview of Closed Loop Step-Servo

TSM Series - Integrated Step-Servo

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical): 12-48VDC/12-70VDC
Encoder: Incremental 20000 counts/rev
Enhanced Intelligence:
- Automatic load inertia detection
- Extended homing and software limit
- Built-in position table up to 63 points

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control, Daisy Chain
- Stand alone operation

Inputs and Outputs:
- P Type- 4 Digital Inputs, 3 Digital Outputs, Encoder Outputs
- S/Q/C Type- 8 Digital Inputs, 4 Digital Outputs, 1 Analog Input

Communication:

Position Control
Velocity Control
Torque Control

CE RoHS Compliant SCL CANopen Modbus

SSM Series - Integrated Step-Servo

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical): 12-48VDC/12-70VDC
Encoder: Incremental 20000 counts/rev
Easy Wiring with Spring Connectors
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- S/Q Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 3 Digital Inputs, 1 Digital Output

Communication:

Position Control
Velocity Control
Torque Control

CE RoHS Compliant SCL CANopen Modbus

TXM Series - IP65 Type Integrated Step-Servo

Frame Size: 60mm
Input Voltage(Typical): 12-70VDC
Encoder: Incremental 20000 counts/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 5 Digital Inputs, 3 Digital Outputs

Communication:

Position Control
Velocity Control
Torque Control

CE RoHS Compliant SCL CANopen eSCL EtherNet/IP Modbus

SS Series - Step-Servo Motor & Drive Package

Motor Frame Size: 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): 24-75VDC
Encoder: Incremental 20000 counts/rev
Enhanced Intelligence:
- Automatic load inertia detection and switch set stiffness
- Extended homing and software limit
- Built-in position table up to 63 points

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- P/R Type- 6 Digital Inputs, 2 Digital Outputs, Encoder Outputs
- S/Q/C Type- 8 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs

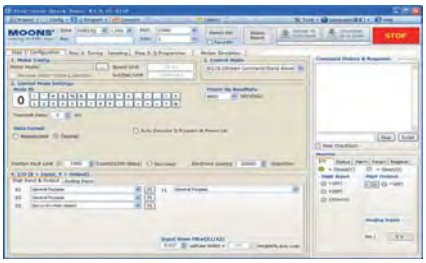
Communication:

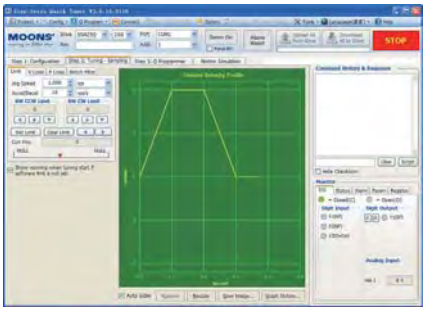
Position Control
Velocity Control
Torque Control

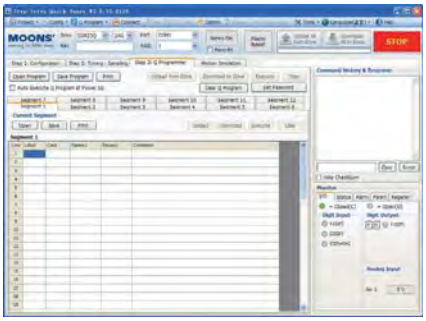
CE RoHS Compliant SCL CANopen Modbus

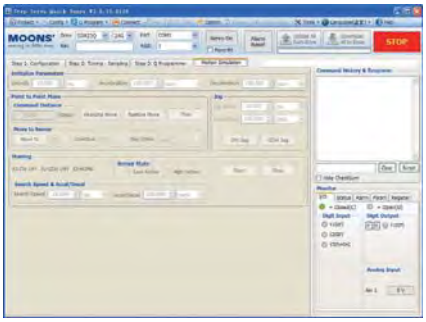
Step-Servo Quick Tuner

Software









Software Features

- Friendly Interface
- Easy setup within just three steps
- Drive setup and configuration
- Servo Tuning and Sampling
- Built-in Q Programmer to create and edit stand-alone programs for Q-compatible drivers
- Motion testing and monitoring
- Write and save SCL command scripts
- Online help integrated
- Support all **Step-Servo** products in TSM/SSM/TXM/SS Series

About this software

Step-Servo Quick Tuner is the PC based software application used to configure, and perform servo tuning, drive testing and evaluation of the **Step-Servo**. System servo control gains, drive functionality, and I/O configuration are set with **Step-Servo** Quick Tuner. It also contains an oscilloscope function to help set the servo control gains. The **Step-Servo** Quick Tuner provides seamless communication with all models whether they have RS-232, RS-485, CANopen or Ethernet communications.

System Requirements

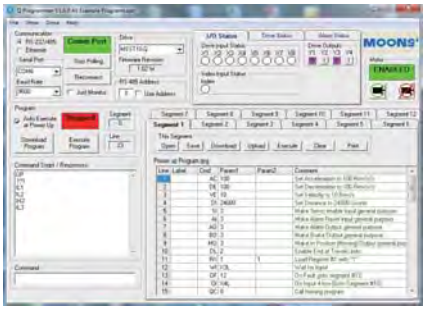
Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

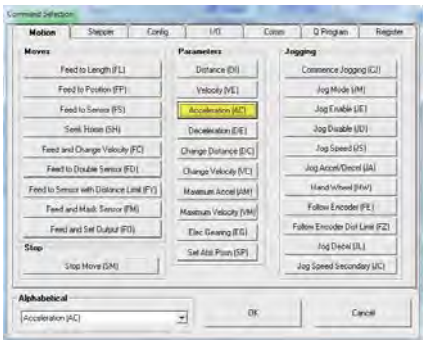
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

Q Programmer

Software





Software Features

- Single-axis motion control
- Stored program execution
- Multi-tasking
- Conditional processing
- Math functions
- Data registers
- Motion Profile simulation
- Online help integrated
- Q Training Examples in Installation Folder
- Support all Q/C Types drive in SS Series
- Support all Q/C/IP Types Integrated Motors in TSM/SSM/TXM Series

About this software

Q Programmer is a single-axis motion control software for programmable stepper and servo drives from MOONS'. The software allows users to create sophisticated and functional programs that Q and Plus drives can run stand-alone. The commands available in the Q programming environment consist of commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

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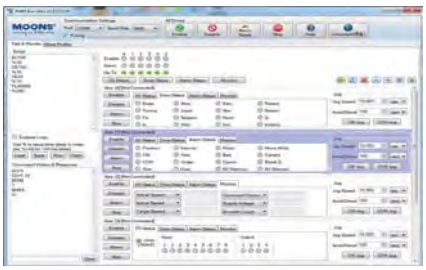
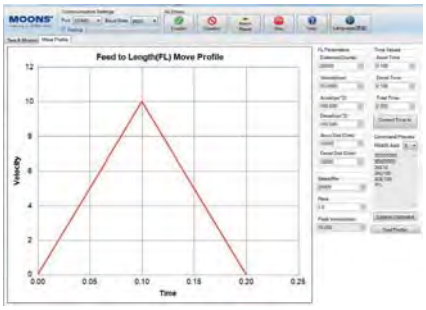
RS485 Bus Utility

Software





Software Features

- Stream SCL commands from the command line
- Simple interface with powerful capability
- Easy setup with RS-485 for 32 axis network motion control
- Monitoring Status of I/O, drive, alarm and the other nine most useful motion parameters
- Write and save SCL command scripts
- Online help integrated
- Supports all RS-485 drives

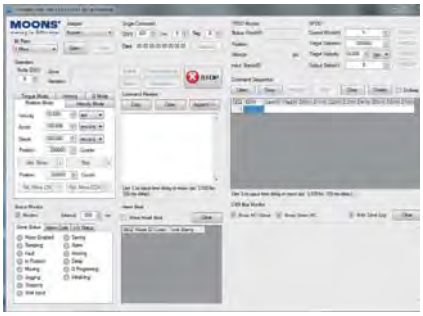
About this software

If you plan to stream serial commands to MOONS' drive using the Serial Command Language (SCL), to build an RS-485 multi-axis network, you'll need a simple terminal emulator to get familiar with and test your command strings and test the network. RS-485 Bus Utility is the ideal choice because it sends command strings as a packet, with minimal delay between characters, and properly terminated with a carriage return. Other terminal applications send each character as it's typed, making them difficult to use with SCL commands.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

CANopen Test Tool



Software Features

- Friendly User Interface
- Multiple operation Mode Support
- Multi-Thread, High Performance
- CAN bus monitor and log function
- Kvaser/PEAK/ZLG adapter support

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

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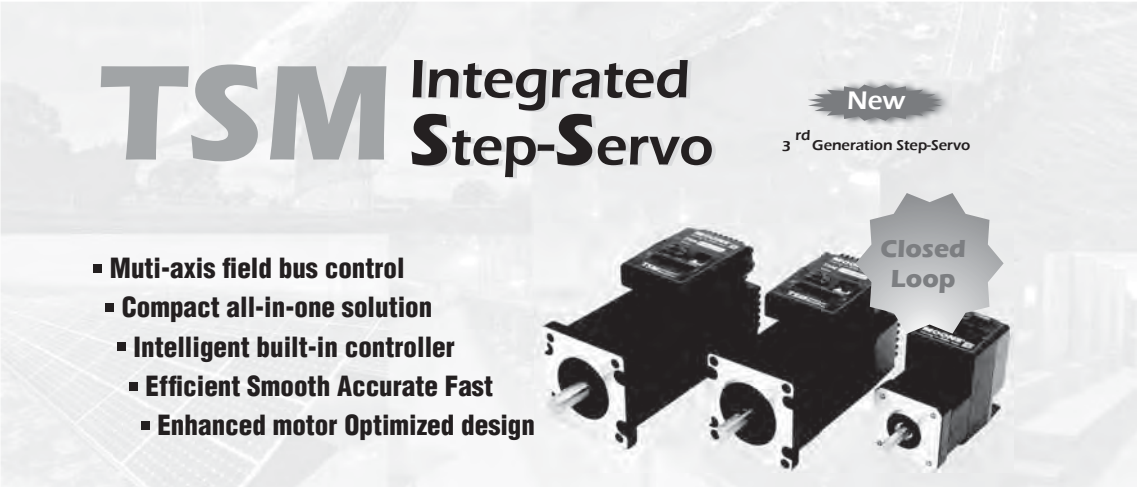
Appendix		Accessories		Stepper Motor		3-Phase Stepper Drive		2-Phase Stepper Drive				Integrated Stepper Motor			Step-Servo				Step-Servo MOONS'
								DC Input		AC Input									
Glossary	Software	Cables	Power Supplies	3-Phase	2-Phase	DC Input	AC Input	With Controller **ST**	Pulse Input **SR**	With Controller **STAC**	Pulse Input **SRAC**	IP65 With Controller **SWM**	With Controller **STM**	Pulse Input **STM-R**	Motor & Drive **SS**	IP65 Integrated **TXM**	Integrated **SSM**	Integrated **TSM**	

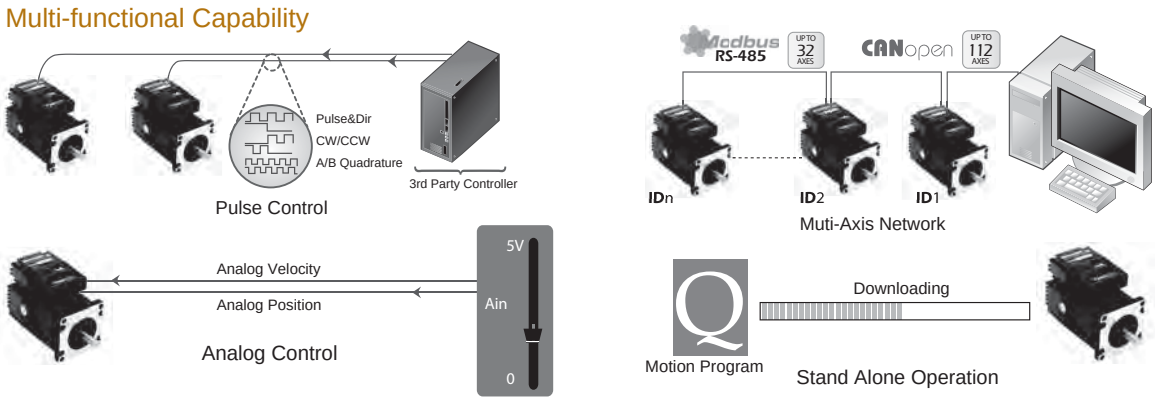


The **Step-Servo** is an innovative revolution for the world of stepper motor, it enhances the stepper motors with servo technology to create a product with exceptional feature and broad capability.

TSM is MOONS' 3rd generation integrated **Step-Servo** and compact motor+drive+encoder+controller all-in-one solution. With improved technology, TSM upgrades significant key features based on 2nd generation SSM and operates more efficient and intelligent.

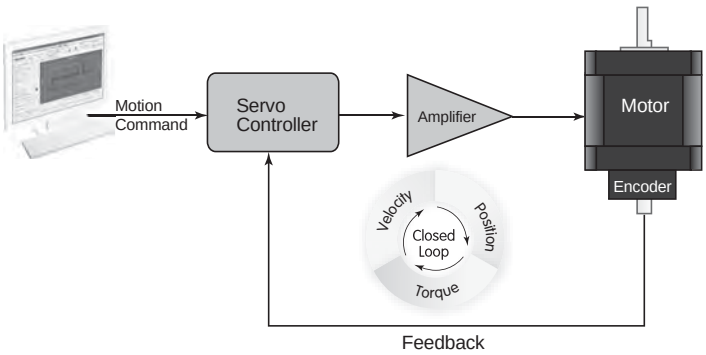
Features

Multi-functional Capability



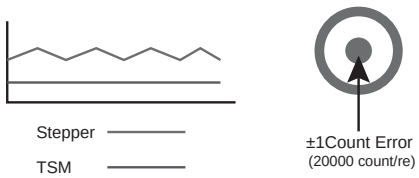
Closed Loop

- Very tight position and velocity control for the most demanding applications.
- Robust servo loops that tolerate wide fluctuation in load inertia and frictional loading.
- Precise positioning to within ±1 count (0.018°) using high resolution(20000 counts/rev) encoder.



Smooth & Accurate

- Space vector current control with 5000 line high resolution encoder, gives smooth and quiet operation, especially at low speeds.
  ------A feature never found with traditional stepping motors
- High stiffness due to the nature of the stepping motor combined with the highly responsive servo control
  ------Accurate position control both while running and static positioning



Low Heating/High Efficiency

- Uses only the current required by the application, generating minimum heat output.
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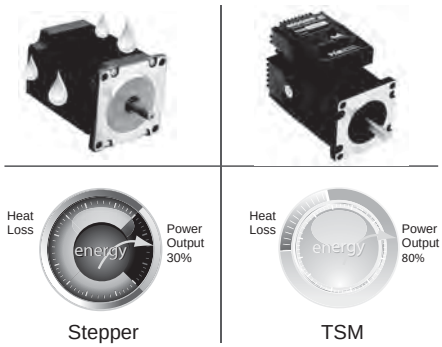
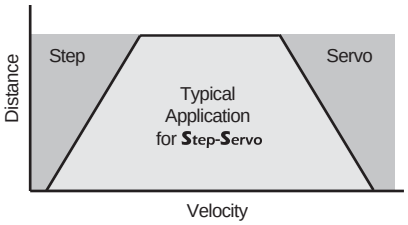
- Being able to use almost 100% of torque, allows for more efficient and compact motor usage.



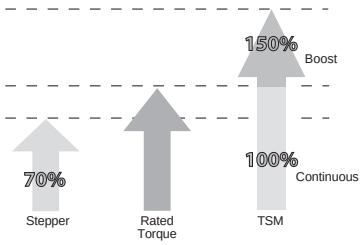
Fast Response



- When performing fast point-to-point moves, the high torque output and advanced servo control provides a very responsive system far exceeding what can be done with a conventional stepper system.

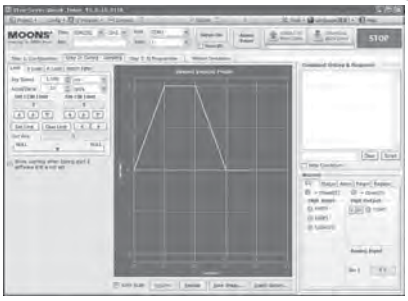
High Torque

- Because the TSM operates in full servo mode, all the available torque of the motor can be used.
- The motor can provide as much as 50% more torque in many applications. High torque capability often eliminates the need for gear reduction.
- Boost torque capability can provide as much as 50% more torque for short, quick moves.

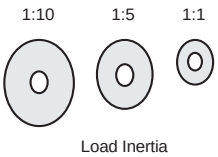


Motion Monitoring

- For difficult control situations where performing a precise move is necessary, the **Step-Servo** Quick Tuner provide an easy to use interface for performing and monitoring the motion profile.
- Many common parameters such as Actual Speed or Position Error can be monitored to evaluate system performance.
- The monitoring is interactive with the servo tuning capability so that optimum performance can be achieved.



Easy Tunning



- Pre-defined tuning parameters for maximum control performance and stability.
- Easy selection list provides the level of control desired.
- In most cases NO extra manual tuning is required.

Key Enhancement based on SSM family(2nd Generation)

- Up to 8 digital inputs, 4 digital outputs and 1 analog input for S/Q/C type
- A/B/Z differential encoder signal output supported for P type
- Automatic load inertia detection
- On board daisy chain connection for field bus control(RS-485, **Modbus/RTU & CANopen**)
- Extended homing features for S/Q type
- Software limit for S/Q type
- Built-in position table up to 63 points for S type

■ TSM Lineup

◇ Torque and Frame size

	Frame Size(mm)	Torque(N•m)	Supply Voltage(VDC)
TSM17□-1□G	42	0.3	12-48
TSM17□-2□G		0.5	
TSM17□-3□G		0.6	
TSM23□-2□G	56	1.0	12-70
TSM23□-3□G		1.5	
TSM24□-3□G	60	2.5	

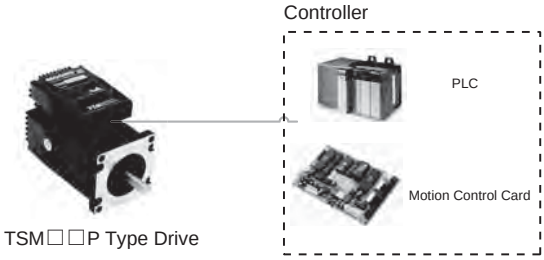
◇ Control Modes

-P Pulse Input type

Controlled via pulse generator.

Main Features

- Accepts three types of pulse signal input as Pulse&Direction, CW/CCW and A/B Quadrature
- Encoder signal output, A/B/Z differential

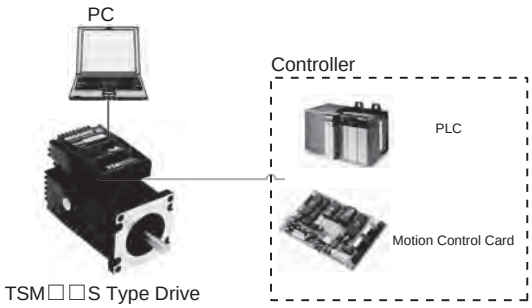


-S Basic type with serial communication

Controlled via pulse signals, analog signal or MOONS' SCL streaming series commands.

Main Features

- Pulse control
- Analog control
- Host real time control using SCL via RS-232/RS-485
- Up to 32 axes per channel for RS-485
- Support Position Table(up to 63 points)

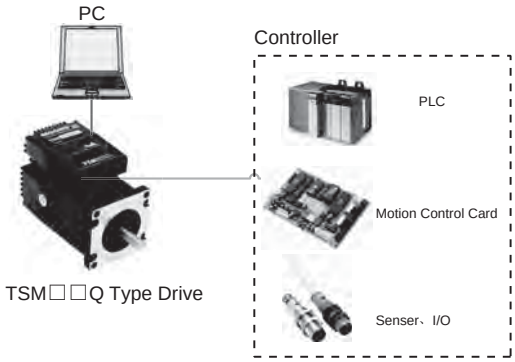


-Q Built-in programmable motion controller (Includes Modbus/RTU Type)

Run stand-alone with sophisticated and functional programs. Commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

Main Features

- Stand-alone operation plus Serial host control
- Math operations
- Register manipulation
- Multi-tasking
- With all features in S type
- Modbus/RTU network, up to 32 axes per channel

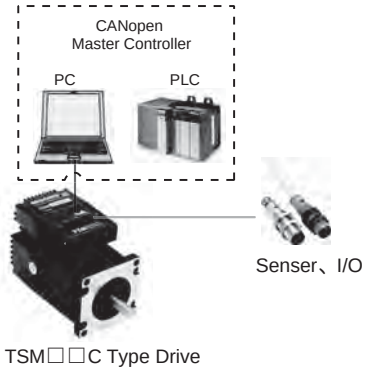


-C CANopen type

Operates on a CANopen communication network and conforms to CiA301 and CiA402. It supports runing stored Q programs via MOONS'-specific CANopen objects.

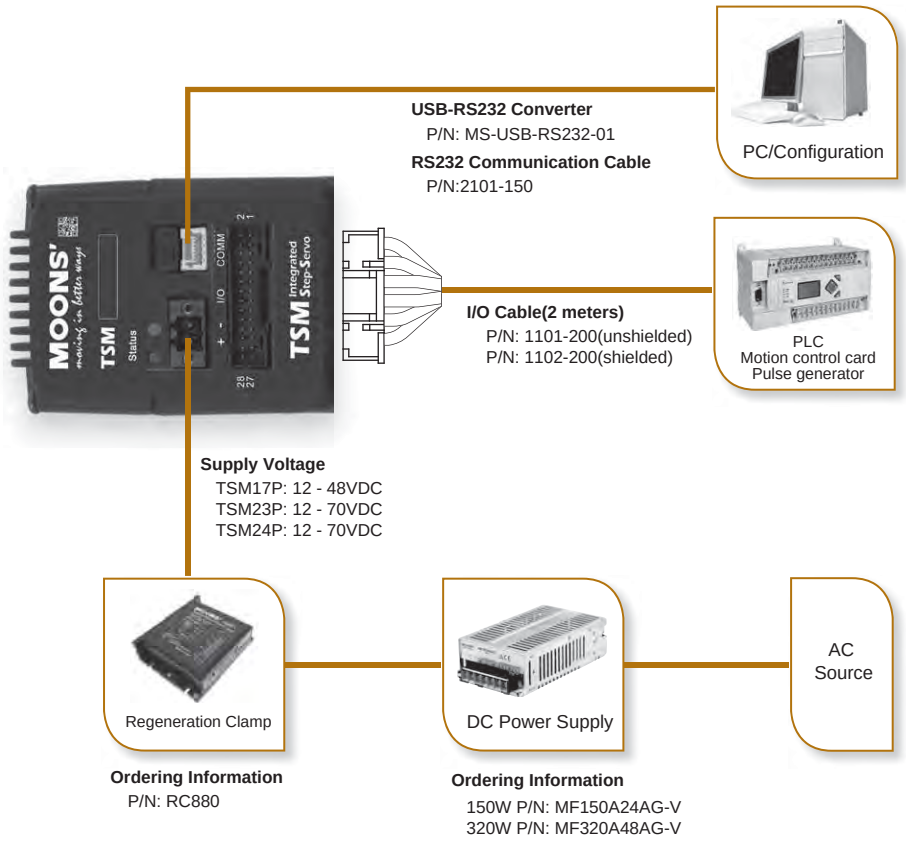
Main Features

- CANopen network
- Up to 112 axes per channel
- Objects for Q programming



■ System configuration

◇ -P Pulse Input type

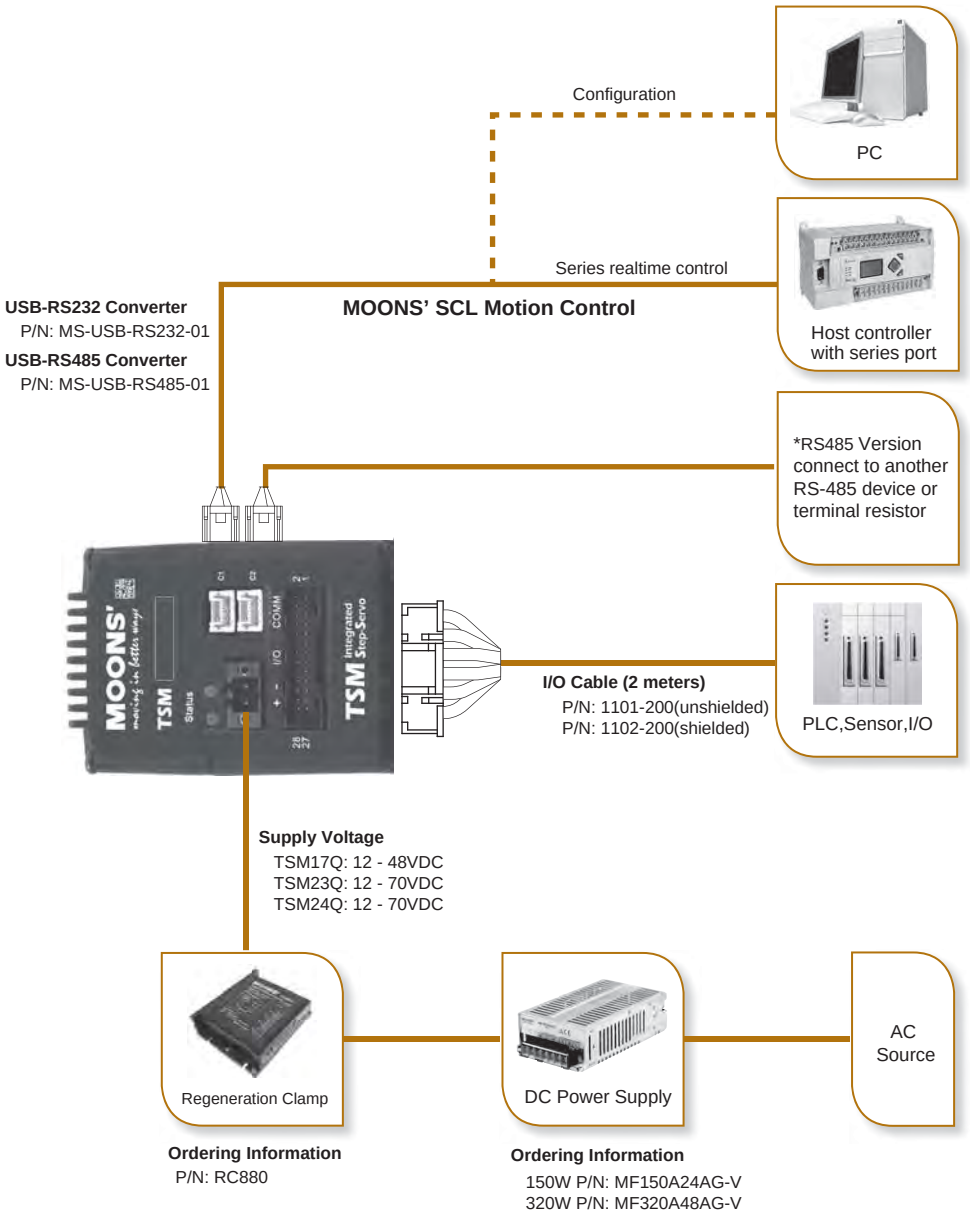


◇ Optional Accessories

P/N	Catagory	Technical Specification
MF150A24AG-V	Switching power supplier	150W, 24V
MF320A48AG-V	Switching power supplier	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W
MS-USB-RS232-01	USB Converter	USB-RS232
1101- □□□	Cable	I/O cable, unshielded
1102- □□□	Cable	I/O cable, shielded
2101- □□□	Cable	RS232 communication cable

* □□□stands for length, unit:cm, ex.100 stands for 100cm

◇ -S Basic type with series communication

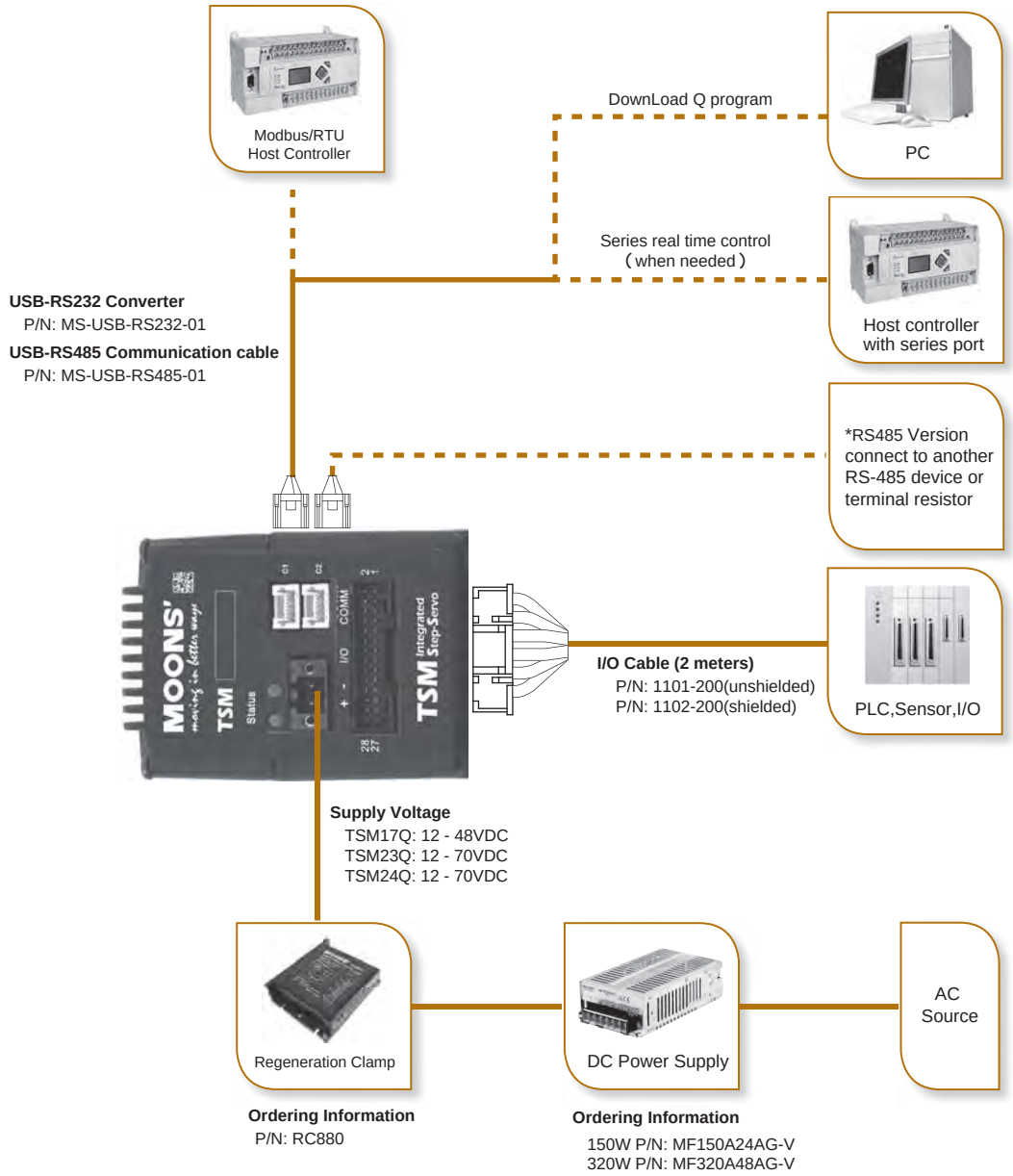


◇ Optional Accessories

P/N	Catagory	Technical Specification
MF150A24AG-V	Switching power supplier	150W, 24V
MF320A48AG-V	Switching power supplier	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W
MS-USB-RS232-01	USB Converter	USB-RS232
MS-USB-RS485-01	USB Converter	USB-RS485
1101- □□□	Cable	I/O cable, unshielded
1102- □□□	Cable	I/O cable, shielded
2101- □□□	Cable	RS232 communication cable
2105- □□□	Cable	RS485 Daisy Chain communication cable

* □□□stands for length, unit:cm, ex.100 stands for 100cm

◇ -Q Built-in programmable motion controller(Includes Modbus/RTU Type)

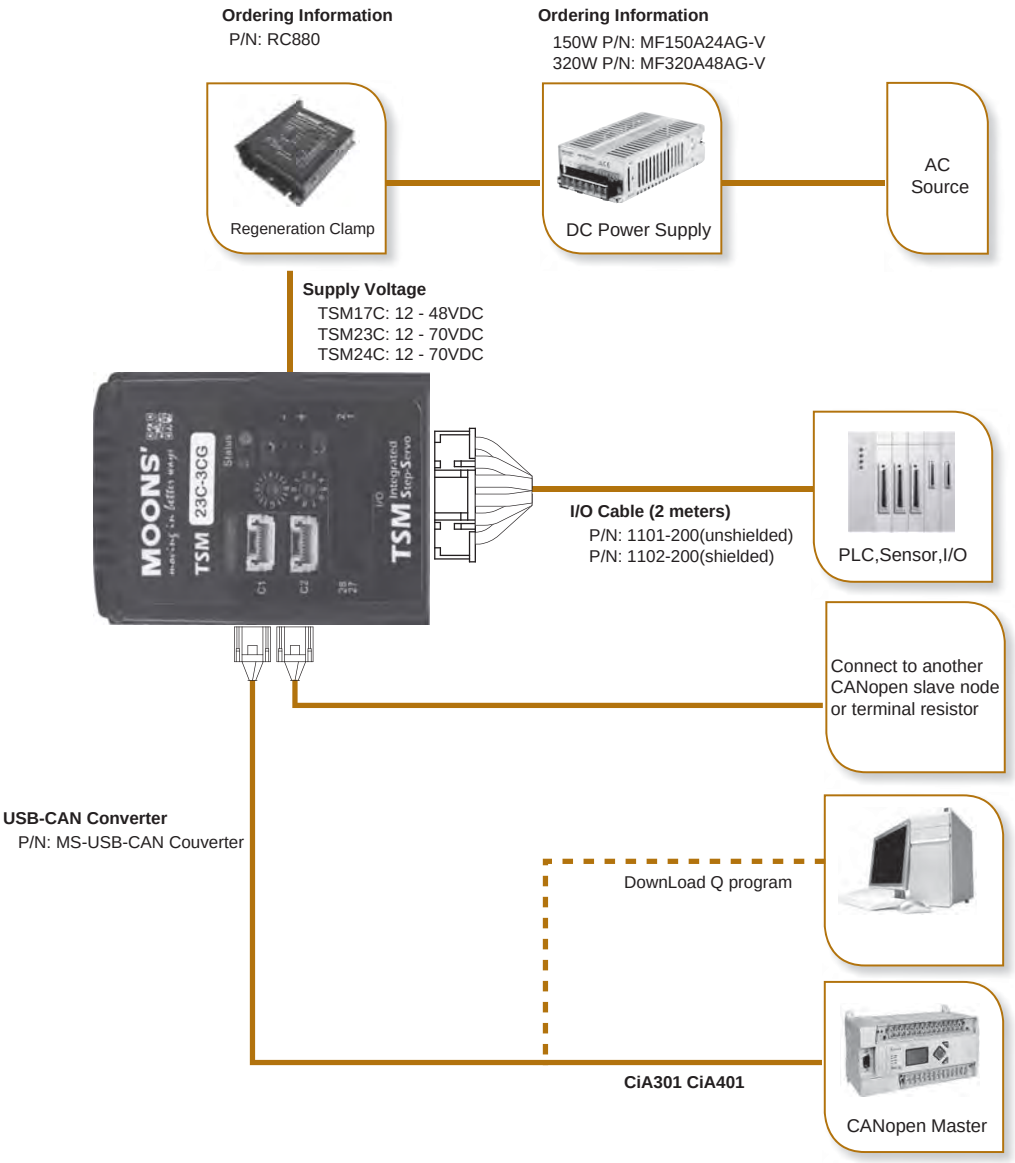


◇ Optional Accessories

P/N	Catagory	Technical Specification
MF150A24AG-V	Switching power supplier	150W, 24V
MF320A48AG-V	Switching power supplier	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W
MS-USB-RS232-01	USB Converter	USB-RS232
MS-USB-RS485-01	USB Converter	USB-RS485
1101- □□□	Cable	I/O cable, unshielded
1102- □□□	Cable	I/O cable, shielded
2101- □□□	Cable	RS232 communication cable
2105- □□□	Cable	RS485 Daisy Chain communication cable

* □□□stands for length, unit:cm, ex.100 stands for 100cm

◇ -C CANopen type



◇ Optional Accessories

P/N	Catagory	Technical Specification
MF150A24AG-V	Switching power supplier	150W, 24V
MF320A48AG-V	Switching power supplier	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W
MS-USB-RS232-01	USB Converter	USB-RS232
MS-USB-CAN-01	USB Converter	USB-CAN
1101- □□□	Cable	I/O cable, unshielded
1102- □□□	Cable	I/O cable, shielded
2113-150	Cable	RS232 communication cable(C Type)
2110- □□□	Cable	CANopen Daisy Chain communication cable

＊ □□□stands for length, unit:cm, ex.100 stands for 100cm

Numbering System

TSM 17 S-2 A G

- TSM Series
- Frame Size 17,23,24
- Control
  - P=Pulse Type
  - S=Basic Type
  - Q=Q Program Type (Modbus/RTU Type)
  - C=CANopen Type
- Motor Size
  - 1 = 1 stack
  - 2 = 2 stack
  - 3 = 3 stack
- Communications
  - A=RS-232
  - R=RS-485
  - C=CANopen
- Feedback
  - G=5000-Line encoder

Ordering Information

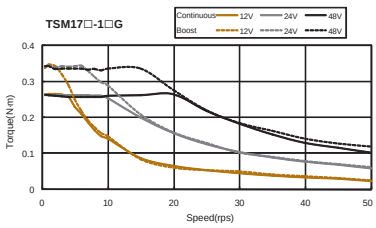
Model	Torque	Control	I/O	Encoder Output	RS-232	RS-485	Modbus/RTU	CANopen
TSM17P-1AG	0.3N·m	P	4 digital inputs, 3 digital outputs	✓	✓			
TSM17S-1AG		S	8 digital inputs, 4 digital outputs, 1 analog input		✓			
TSM17S-1RG						✓		
TSM17Q-1AG		Q			✓			
TSM17Q-1RG						✓	✓	
TSM17C-1CG		C			✓			✓
TSM17P-2AG	0.5N·m	P	4 digital inputs, 3 digital outputs	✓	✓			
TSM17S-2AG		S	8 digital inputs, 4 digital outputs, 1 analog input		✓			
TSM17S-2RG						✓		
TSM17Q-2AG		Q			✓			
TSM17Q-2RG						✓	✓	
TSM17C-2CG		C			✓			✓
TSM17P-3AG	0.6N·m	P	4 digital inputs, 3 digital outputs	✓	✓			
TSM17S-3AG		S	8 digital inputs, 4 digital outputs, 1 analog input		✓			
TSM17S-3RG						✓		
TSM17Q-3AG		Q			✓			
TSM17Q-3RG						✓	✓	
TSM17C-3CG		C			✓			✓
TSM23P-2AG	1.0N·m	P	4 digital inputs, 3 digital outputs	✓	✓			
TSM23S-2AG		S	8 digital inputs, 4 digital outputs, 1 analog input	✓	✓			
TSM23S-2RG						✓		
TSM23Q-2AG		Q		✓	✓			
TSM23Q-2RG						✓	✓	
TSM23C-2CG		C			✓			✓
TSM23P-3AG	1.5N·m	P	4 digital inputs, 3 digital outputs	✓	✓			
TSM23S-3AG		S	8 digital inputs, 4 digital outputs, 1 analog input	✓	✓			
TSM23S-3RG						✓		
TSM23Q-3AG		Q		✓	✓			
TSM23Q-3RG						✓	✓	
TSM23C-3CG		C			✓			✓
TSM24P-3AG	2.5N·m	P	4 digital inputs, 3 digital outputs	✓	✓			
TSM24S-3AG		S	8 digital inputs, 4 digital outputs, 1 analog input	✓	✓			
TSM24S-3RG						✓		
TSM24Q-3AG		Q		✓	✓			
TSM24Q-3RG						✓	✓	
TSM24C-3CG		C			✓			✓

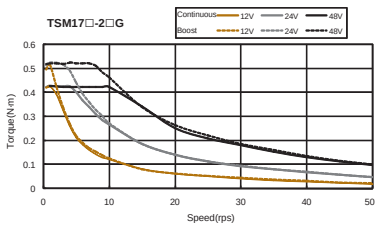
Specifications—Frame size 42mm

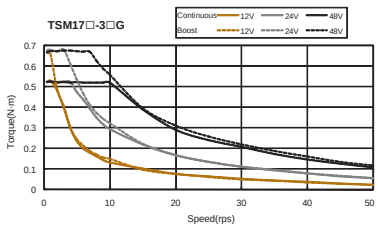
Model	Pulse input type	TSM17P-1AG	TSM17P-2AG	TSM17P-3AG
	Basic type	TSM17S-1□G	TSM17S-2□G	TSM17S-3□G
	Q program type(Includes **Modbus/RTU** type)	TSM17Q-1□G	TSM17Q-2□G	TSM17Q-3□G
	CANopen type	TSM17C-1CG	TSM17C-2CG	TSM17C-3CG
Holding Torque	N•m	0.3	0.5	0.6
Rotor Inertia	g•cm^2	38	57	82
Supply Voltage	VDC	12-48		
Encoder Resolution	counts/rev	20000	20000	20000
Maximum Speed	RPM	3600	3600	3600
Mass	g	280	360	440

Enter A(RS232) or R(RS485) in the box(□) within the model name

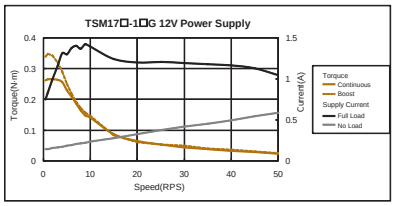
Torque Curves

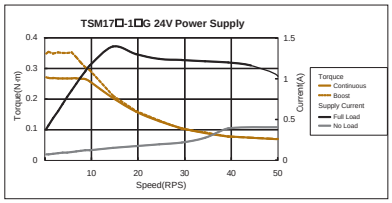


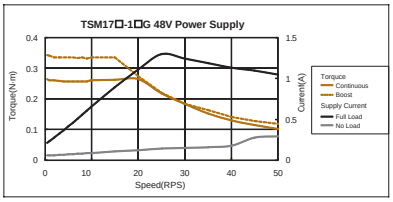


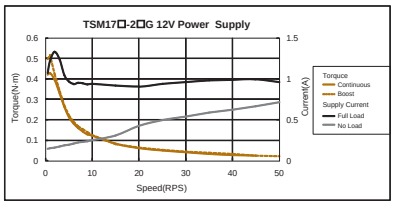


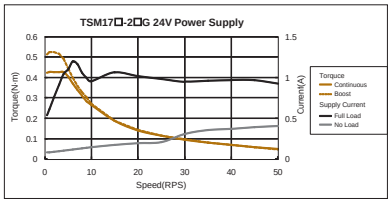
Input Current Curves Characteristics

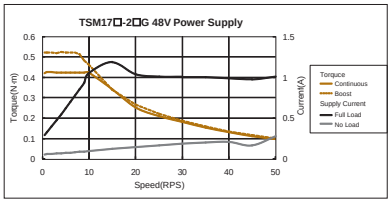


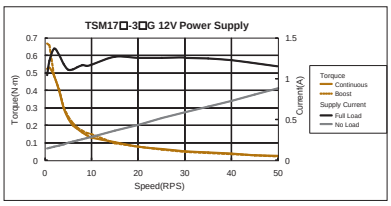


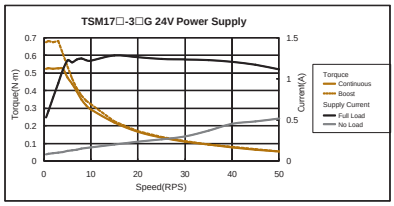


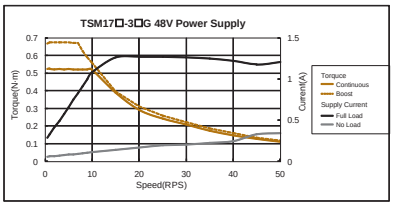












■ Electrical Specifications—Frame size 42mm

	Pulse input type TSM17P-■AG	Basic type TSM17S-■□G	Q program type TSM17Q-■□G	CANopen type TSM17C-■CG
Control Command	Pulse input	Pulse input Analog signal Position table SCL	Pulse input Analog signal SCL Q Program **Modbus/RTU**	Q program CANopen
Pulse signal type	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	-
Maximum Input Pulse Frequency	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	-
Digital Input	4	8	8	8
Digital Output	3	4	4	4
Analog Input	-	1	1	1
Encoder Output	20,000 counts/rev A/B/Z Differential	-	-	-
Digital Input Specification	Optical Isolated 5-24VDC			
Digital Onput Specification	Optical Isolated 30VDC/100mA			
Analog Input Specification	AIN referenced to GND, Range 0–5VDC, Resolution:12bits			
Supply Voltage	12-48VDC			
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)			
Comunication	RS-232	RS-232 or RS-485	RS-232 or RS-485	RS-232&CANopen
Protocol	-	SCL	**Modbus/RTU** or SCL	**CANopen**

Enter motor length 1,2,3 in the box(■) within the model name
Enter A(RS232) or R(RS485) in the box(□) within the model name

◇ RS485 Specifications

Interface	RS485 or **Modbus/RTU**
Baud Rate(bps)	9600/19200/38400/57600/115200
Maximum Distance	Due to transmission baud rate
Maximum Connections	32 axes per channel
Communication Cable	Twisted Shielded Cable
Address Setting	Via **Step-Servo** Quick Tuner

◇ CANopen Specifications

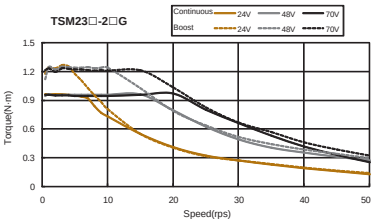
Interface	**CANopen** CiA301 CiA402
Bit Rate(bps)	1M/800K/500K/250K/125K/50K/20K/12.5K
Maximum Distance	Due to transmission bit rate
Maximum Slave Nodes	112 axes per channel
Communication Cable	Twisted Shielded Cable
Node ID Setting	On Board Rotary Switch: Lower 4 bits 0H-FH **Step-Servo** Quick Tuner: Upper 3 bits 00H-7FH

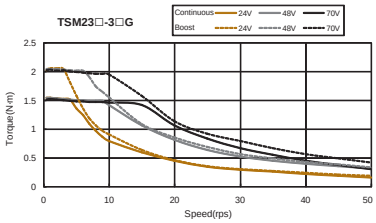
Specifications—Frame size 56mm, 60mm

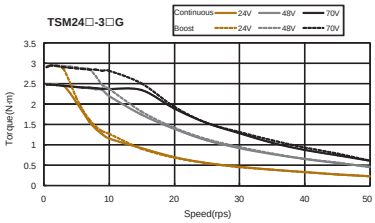
Model	Pulse input type	TSM23P-2AG	TSM23P-3AG	TSM24P-3AG
	Basic type	TSM23S-2□G	TSM23S-3□G	TSM24S-3□G
	Q program type(Includes **Modbus/RTU** type)	TSM23Q-2□G	TSM23Q-3□G	TSM24Q-3□G
	CANopen type	TSM23C-2CG	TSM23C-3CG	TSM24C-3CG
Holding Torque	N•m	1.0	1.5	2.5
Rotor Inertia	g•cm^2	260	460	900
Supply Voltage	VDC	12-70		
Encoder Resolution	counts/rev	20000	20000	20000
Maximum Speed	RPM	3600	3600	3600
Mass	g	850	1200	1580

Enter A(RS232) or R(RS485) in the box(□) within the model name

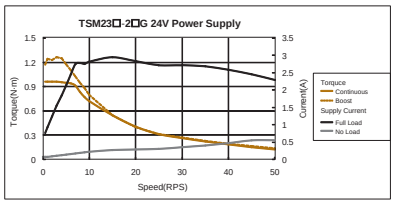
Torque Curves

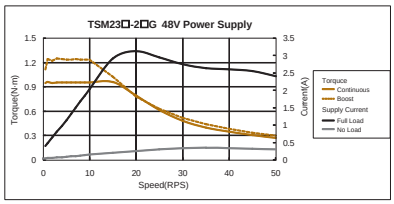


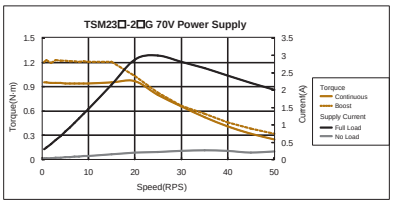


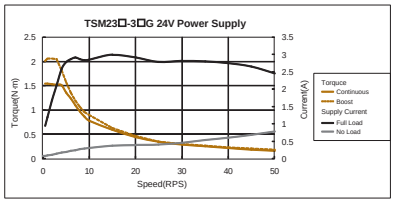


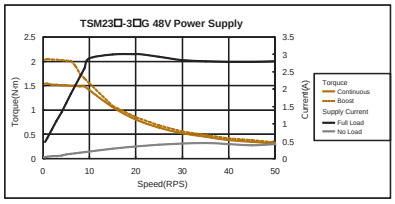
Input Current Curves Characteristics

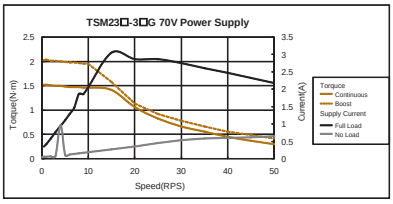


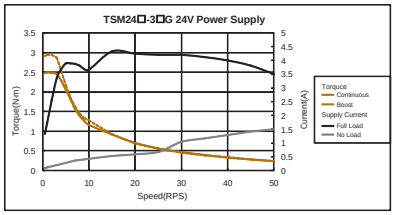


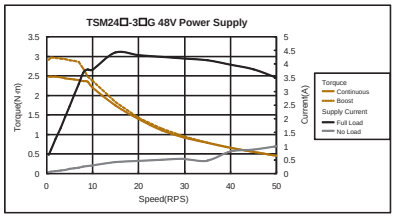


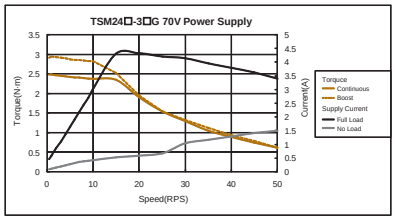












■ Electrical Specifications—Frame size 56mm, 60mm

	Pulse input type TSM2◇P-■AG	Basic type TSM2◇S-■□G	Q program type TSM2◇Q-■□G	CANopen type TSM2◇C-□CG
Control Command	Pulse input	Pulse input Analog signal Position table SCL	Pulse input Analog signal SCL Q Program **Modbus/RTU**	Q program CANopen
Pulse signal type	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	-
Maximum Input Pulse Frequency	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	-
Digital Input	4	8	8	8
Digital Output	3	4	4	4
Analog Input	-	1	1	1
Encoder Output	20,000 counts/rev A/B/Z Differential	20,000 counts/rev A/B/Z Differential	20,000 counts/rev A/B/Z Differential	-
Digital Input Specification	Optical Isolated 5-24VDC			
Digital Onput Specification	Optical Isolated 30VDC/100mA			
Analog Input Specification	AIN referenced to GND, Range 0–5VDC, Resolution: 12bits			
Supply Voltage	12-70VDC			
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)			
Comunication	RS-232	RS-232 or RS-485	RS-232 or RS-485	RS-232&CANopen
Protocol	-	SCL	**Modbus/RTU** or SCL	**CANopen**

Enter frame size 3(56mm)or 4(60mm)in the box(◇) within the model name
Enter motor length 2,3 in the box(■) within the model name
Enter A(RS232) or R(RS485) in the box(□) within the model name

◇ RS485 Specifications

Interface	RS485 or **Modbus/RTU**
Baud Rate(bps)	9600/19200/38400/57600/115200
Maximum Distance	Due to transmission baud rate
Maximum Connections	32 axes per channel
Communication Cable	Twisted Shielded Cable
Address Setting	Via **Step-Servo** Quick Tuner

◇ CANopen Specifications

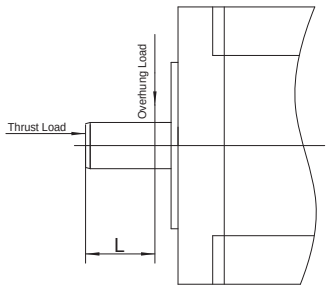
Interface	**CANopen** CiA301 CiA402
Bit Rate(bps)	1M/800K/500K/250K/125K/50K/20K/12.5K
Maximum Distance	Due to transmission bit rate
Maximum Slave Nodes	112 axes per channel
Communication Cable	Twisted Shielded Cable
Node ID Setting	On Board Rotary Switch: Lower 4 bits 0H-FH **Step-Servo** Quick Tuner: Upper 3 bits 00H-7FH

General Specifications

		TSM Integrated Step-Servo
Insulation Class		Class B(130°C)
Insulation Resistance		100MΩ/DC500V
Dielectric Strength		500VAC 1 minute
Operating Environment	Ambient Temperature	0~+40°C(non-freezing)
	Ambient Humidity	90% or less(non-condensing)
	Atmosphere	No corrosive gases, dust, water or oil
Degree of Protection		IP20

Permissible Overhung Load and Permissible Thrust Load(Unit:N)

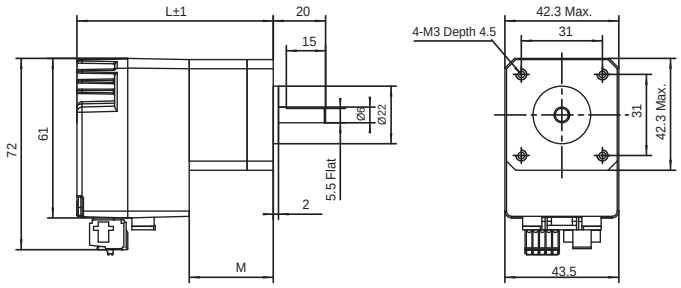
Frame Size	Model	Permissible Overhung Load Distance(L) from Shaft End(mm) 0	5	10	15	20	Permissible Thrust Load
42mm	TSM17□-1□G	35	44	58	85	-	Less than the motor mass
	TSM17□-2□G						
	TSM17□-3□G						
56mm	TSM23□-2□G	63	75	95	130	190	
	TSM23□-3□G						
60mm	TSM24□-3□G	90	100	130	180	270	



■ Dimensions(Unit:mm)

◇ Frame Size 42mm

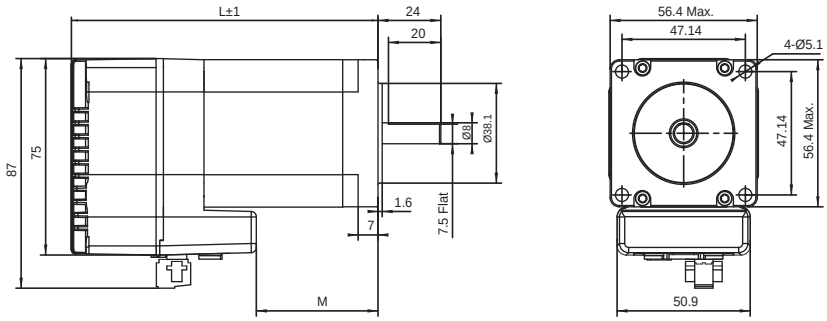
Model	Length "L"	Length"M"
TSM17□-1□G	695	26.5
TSM17□-2□G	75	32.1
TSM17□-3□G	83.5	40.6



* 5 mm diameter shaft available per request.

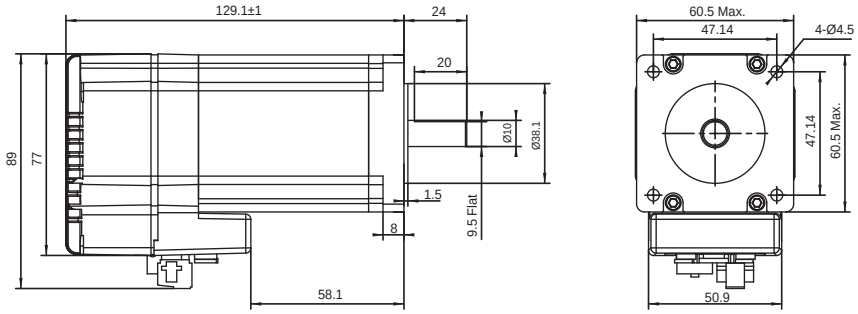
◇ Frame Size 56mm

Model	Length "L"	Length"M"
TSM23□-2□G	95.2	24.5
TSM23□-3□G	117.2	46.5



* 6.35 mm diameter shaft available per request.

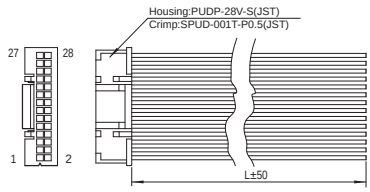
◇ Frame Size 60mm



* 8 mm diameter shaft available per request.

◇ General Purpose I/O Cable(unshielded)

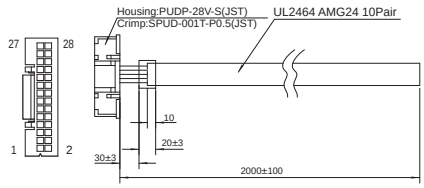
P/N(unshielded)	Length
1101-100	1m
1101-200	2m
1101-500	5m



Pin No.	Assignment	Description	Color	Pin No.	Assignment	Description	Color
1	X1+	High Speed Digital Input	BLU	15	X8+	X8 Digital Input	GRN
2	X1-		BLU/WHT	16	X8-		GRN/WHT
3	X2+	High Speed Digital Input	YEL	17	Y1	Y1 Digital Input	BLU
4	X2-		YEL/WHT	18	Y2	Y2 Digital Input	YEL
5	X3	X3 Digital Input	GRN	19	Y3	Y3 Digital Input	BRN
6	X4	X4 Digital Input	ORG	20	YCOM	Y Output COM	BLK
7	X5	X5 Digital Input	GRY	21	Y4+	Y4 Digital COM	RED
8	X6	X6 Digital Input	PPL	22	Y4-		RED/WHT
9	XCOM	X Digital Input COM	WHT	23	Z+	Encoder Output Z (if applicable)	BLK
10	+5V	+5V Analog Voltage	RED	24	Z-		BLK/WHT
11	AIN	Analog Input	BLU	25	B+	Encoder Output B (if applicable)	GRN
12	GND	Analog Input Ground	BLK	26	B-		GRN/WHT
13	X7+	X7 Digital Input	ORG	27	A+	Encoder Output A (if applicable)	ORG
14	X7-		ORG/WHT	28	A-		ORG/WHT

◇ General Purpose I/O Cable(shielded)

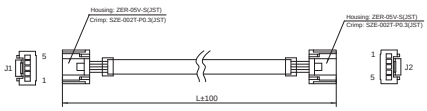
P/N(shielded)	Length
1102-100	1m
1102-200	2m
1102-500	5m



Pin No.	Assignment	Description	Color	Pin No.	Assignment	Description	Color
1	X1+	High Speed Digital Input	BLK	15	NC		
2	X1-		RED	16	NC		
3	X2+	High Speed Digital Input	BLK	17	Y1	Y1 Digital Output	BLK
4	X2-		WHT	18	Y2	Y2 Digital Output	BRN
5	X3	X3 Digital Input	BLK	19	Y3	Y3 Digital Output	BLK
6	X4	X4 Digital Input	GRN	20	YCOM	Y Output COM	ORG
7	NC			21	NC		
8	NC			22	NC		
9	XCOM	X Input COM	BLK	23	Z+	Encoder Output Z (if applicable)	RED
10	+5V	+5V Analog Voltage	BLU	24	Z-		WHT
11	AIN	Analog Input	BLK	25	B+	Encoder Output B (if applicable)	RED
12	GND	Analog Input Ground	YEL	26	B-		GRN
13	NC			27	A+	Encoder Output A (If applicable)	RED
14	NC			28	A-		BLU

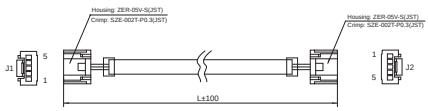
◇ RS485 Daisy Chain Communication Cable

Common Type	Flexible Type	Length
2105-050	2111-050	0.5m
2105-100	2111-100	1m
2105-300	2111-300	3m
2105-500	2111-500	5m



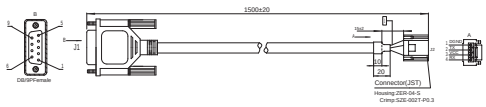
◇ CANopen Daisy Chain Communication Cable

Common Type	Flexible Type	Length
2110-050	2112-050	0.5m
2110-100	2112-100	1m
2110-300	2112-300	3m
2110-500	2112-500	5m



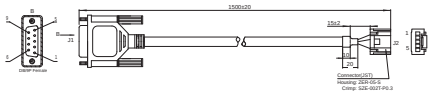
◇ RS232 Communication Cable(P/S/Q Type)

P/N	Length
2101-150	1.5m



◇ RS232 Communication Cable(C Type)

P/N	Length
2113-150	1.5m



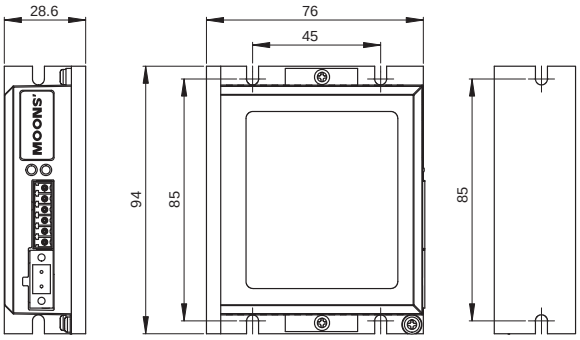
◇ Regeneration Clamp

P/N: RC880

When using regulated power supply you may encounter a problem with regeneration. The kinetic energy caused by regeneration is transferred back to the power supply. This can trip the overvoltage protection of a switching power supply, causing it to shut down.

MOONS' offer the RC880 “regeneration clamp” to solve this problem. If in doubt, use an RC880 for your first installation. If the “regen” LED on the RC880 never flashes, you don’t need the clamp.

Dimensions(Unit:mm)

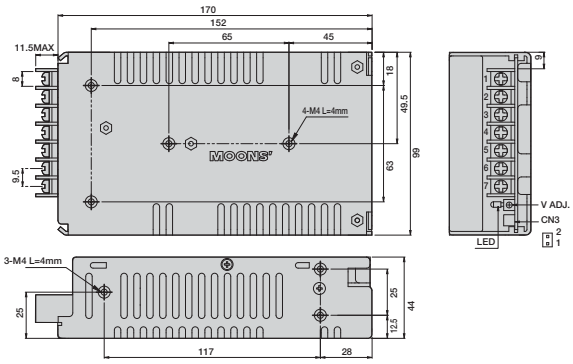


◇ Switching Power Supplier

MOONS' recomend use following switching power supplier with TSM

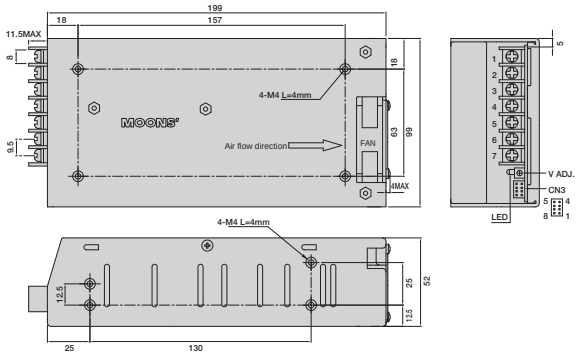
P/N:MF150A24AG-V

150W,24VDC Output



P/N:MF320A48AG-V

320W,48VDC Output



■ USB Converter

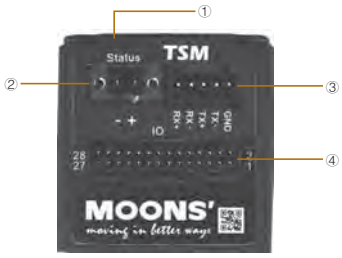
Model: MS-USB-RS232-01
Description: USB-RS232 converter

Model: MS-USB-RS485-01
Description: USB-RS485 converter

Model: MS-USB-CAN-01
Description: USB-CAN converter

■ Connection and Operation(-P Pulse Input Type)

◇ Names and Functions of Parts

TSM17P	TSM23/24P
	

① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection

- LED Error Codes

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

② Power Connector

PN: Weidmuller 1615780000

	Description
+	Power Supply +
-	Power Supply -

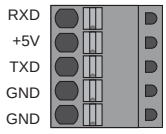
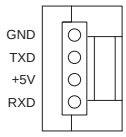
③ Communication Connector

TSM17P

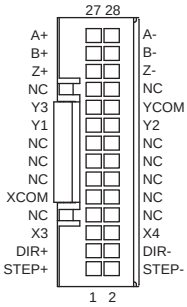
P/N: Phoenix 1881354

TSM23/24P

Housing P/N: JST ZER-04-S
Crimp P/N: JST SZE-002T-P0.3

TSM17P		TSM23/24P	
			
Pin.	**Description**	**Pin.**	**Description**
RXD	Data Receive	RXD	Data Receive
+5V	+5V Power Supply	+5V	+5V Power Supply
TXD	Data Transmit	TXD	Data Transmit
GND	Ground	GND	Ground

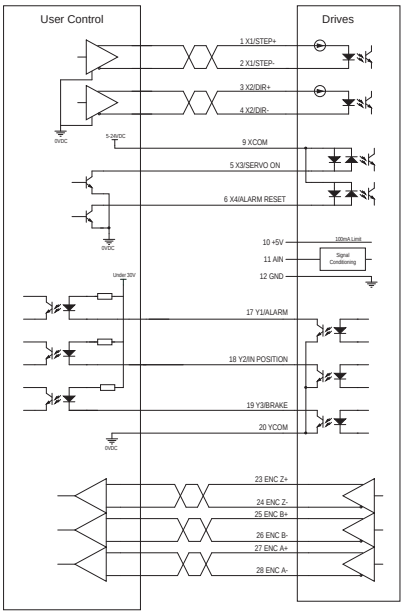
④ I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	STEP+	High Speed Digital Input
2	STEP-	
3	DIR+	High Speed Digital Input
4	DIR-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	NC	N/C
8	NC	
9	XCOM	Digital Input COM
10	NC	N/C
11	NC	
12	NC	
13	NC	
14	NC	
15	NC	
16	NC	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	NC	N/C
22	NC	
23	Z+	Encoder Output Z
24	Z-	
25	B+	Encoder Output B
26	B-	
27	A+	Encoder Output A
28	A-	

◇ Wiring Diagram



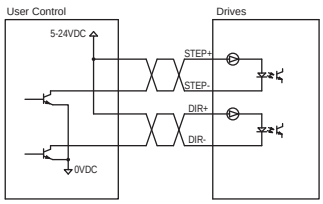
◇ Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

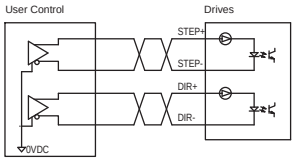
- Circuit above shows when pulse input is line driver type
- Pulse singal input range 5-24VDC
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

● Pulse Input Circuit and Sample Connection

With Open Collector Output



With Line Driver Output



● Pulse Input Mode

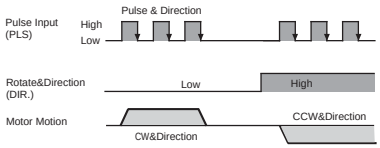
Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction

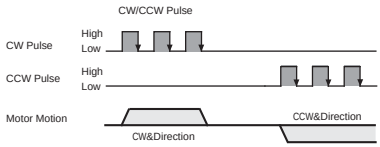


CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in One direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

*Direction definition can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction

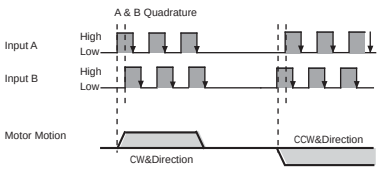


A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder.

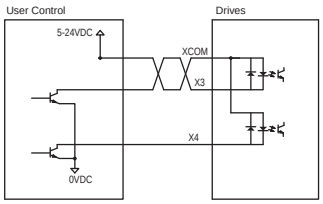
Direction definition can be configured via **Step-Servo** Quick Tuner. Direction is determined via which channel leads the other.

The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.

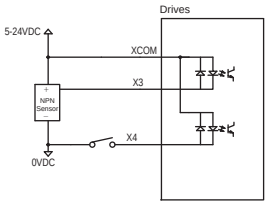


● Digital Input Circuit and Sample Connection

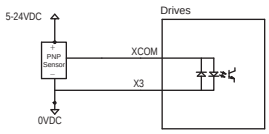
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo ON Input

X3 can be configured as Enable signal to excite the motor.

Alarm Reset Input

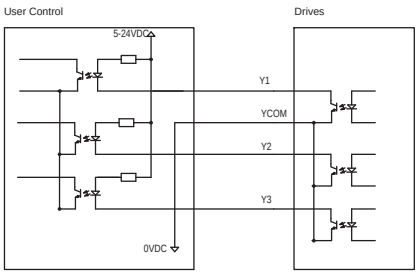
X4 can be configured as Reset signal to clear the alarm and turns to normal stutus as Servo OFF.

Caution: Please make sure there's no error in system before you clear an Alarm.

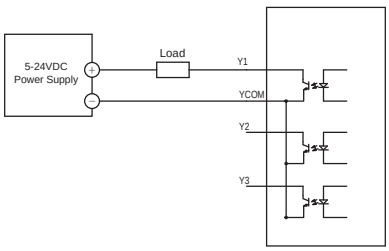
◇ Connecting using Digital Outputs

- Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the red LED will flash.

In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

Y2 can be configured as signal output when motor is moving.

Brake Output

Y3 can be configured as signal output to release brake.

Timing Output

Y3 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°.50 pulses output with one rotation.

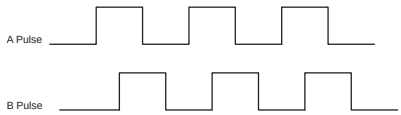
Tach Output

Y3 can be configured as Tach signal output, tach output produces pulses relative to the motor position with configurable resolution:100,200,400,800,1600.

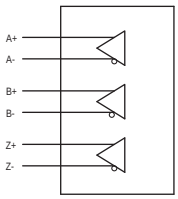
- Encoder Output

- Differential pulse output with channel A/B/Z
- While motor rotates one revelotion, A-Phase/B Phase generate total 20,000 counts, Z-Phase generates one signal.
- The B-Phase output has a 90° phase difference with respect to the A-Phase output. Phase A Leads B 90°while motor rotates by CW direction, phase B leads A 90°while motor rotates by CCW direction.

Pulse Output Signal Chart

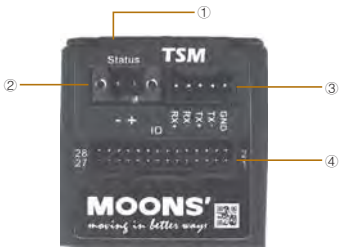


Encoder Output Circuit



■ Connection and Operation(-S/Q Controller Type)

◇ Names and Functions of Parts

TSM17S/Q	TSM23/24S/Q
	

① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection

- LED Error Codes

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

② Power Connector

PN: Weidmuller 1615780000

	Description
+	Power Supply +
-	Power Supply -

③ Communication Connector

TSM17 S/Q

P/N: Phoenix 1881354

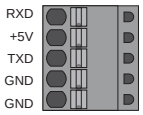
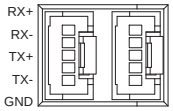
TSM23/24 S/Q(RS232)

Housing P/N: JST ZER-04-S
Crimp P/N: JST SZE-002T-P0.3

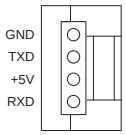
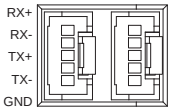
TSM23/24 S/Q(RS485)

Housing P/N: JST ZER-05V-S
Crimp P/N: JST SZE-002T-P0.3

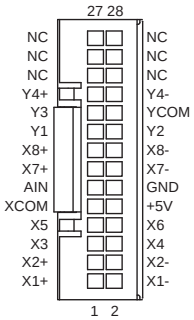
TSM17S/Q

RS232		RS485	
			
Pin.	**Description**	**Pin.**	**Description**
RXD	Data Receive	RX+	Data Receive +
+5V	+5V Power Supply	RX-	Data Receive -
TXD	Data Transmit	TX+	Data Transmit +
GND	Ground	TX-	Data Transmit -
GND	Ground	GND	Ground

TSM23/24S/Q

RS232		RS485	
			
Pin.	**Description**	**Pin.**	**Description**
GND	Ground	RX+	Data Receive +
TX	Data Transmit	RX-	Data Receive -
+5V	+5V Power Supply	TX+	Data Transmit +
RX	Data Receive	TX-	Data Transmit -
		GND	Ground

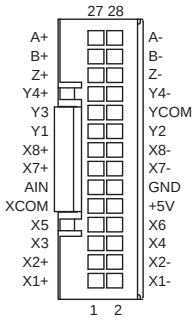
④ TSM17S/Q I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	X1+/STEP+	High Speed Digital Input
2	X1-/STEP-	
3	X2+/DIR+	High Speed Digital Input
4	X2-/DIR-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT 100mA max.
11	AIN	Analog Input
12	GND	Aanlog Ground
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	NC	N/C
24	NC	
25	NC	
26	NC	
27	NC	
28	NC	

④ TSM23/24S/Q I/O Signal Connector

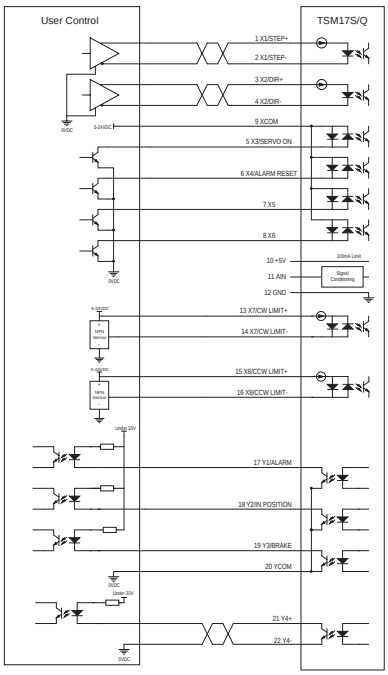


Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

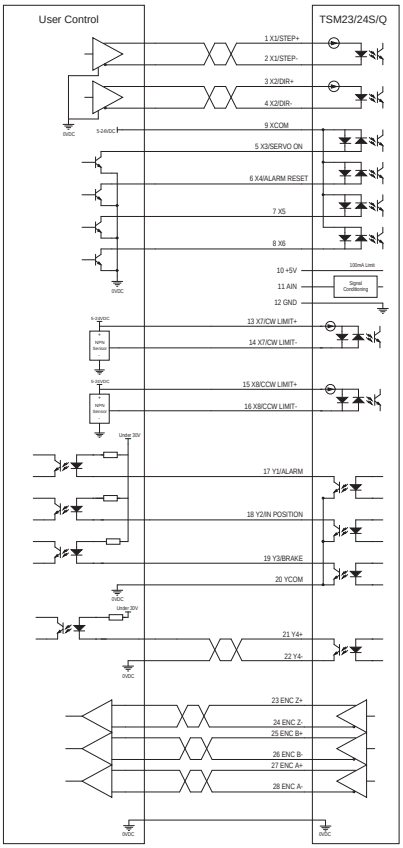
Pin no.	Assignment	Description
1	X1+/STEP+	High Speed Digital Input
2	X1-/STEP-	
3	X2+/DIR+	High Speed Digital Input
4	X2-/DIR-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT 100mA max.
11	AIN	Analog Input
12	GND	Aanlog Ground
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	Z+	Encoder Output Z
24	Z-	
25	B+	Encoder Output B
26	B-	
27	A+	Encoder Output A
28	A-	

◇ Wiring Diagram

- TSM17S/Q



- TSM23/24S/Q



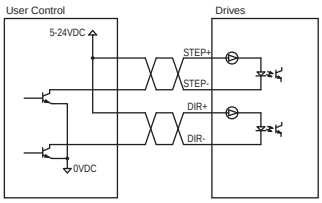
◇ Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

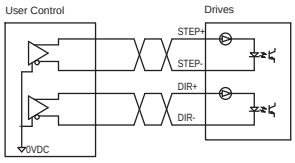
- Circuit above shows when pulse input is line driver type
- Pulse singal input range 5-24VDC
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

- Pulse Input Circuit and Sample Connection

With Open Collector Output



With Line Driver Output



- Pulse Input Mode

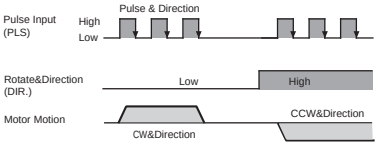
Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction

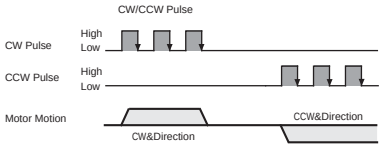


CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in One direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

*Direction definition can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction

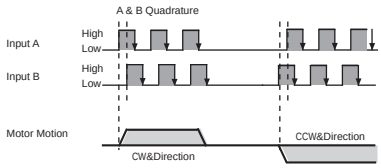


A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder.

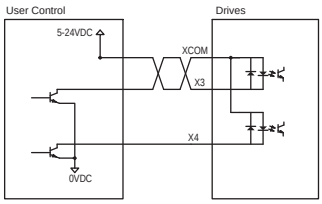
Direction definition can be configured **Step-Servo** Quick Tuner. Direction is determined via which channel leads the other.

The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.

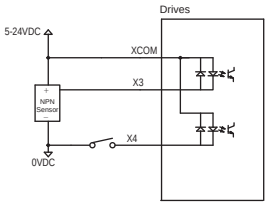


- Digital Input Circuit and Sample Connection

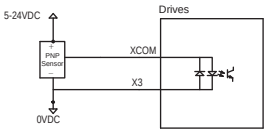
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo ON Input

X3 can be configured as Enable signal to excite the motor.

Alarm Reset Input

X4 can be configured as Reset signal to clear the alarm and turns to normal stutus as Servo OFF.

Caution: Please make sure there's no error in system before you clear an Alarm.

CW/CCW Limit Input

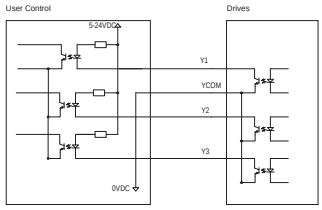
X7 can be configured as CW limit signal input, X8 can be configured as CCW limit signal input.

When either limit signal actives, motor will Servo OFF immidiately and indicate an Alarm.(Unless motors works in Homing mode and defined otherwize)

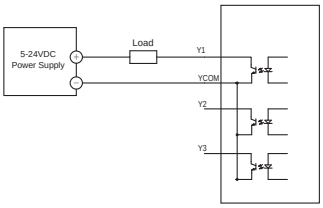
◇ Connecting using Digital Outputs

- Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the red LED will flash.

In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

Y2 can be configured as signal output when motor is moving.

Brake Output

Y3 can be configured as signal output to release brake.

Timing Output

Y4 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°.50 pulses output with one rotation.

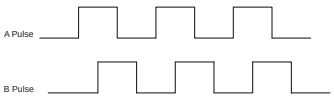
Tach Output

Y4 can be configured as Tach signal output, tach output produces pulses relative to the motor position with configurable resolution:100,200,400,800,1600.

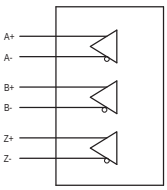
- Encoder Output

- Differential pulse output with channel A/B/Z
- While motor rotates one revelotion, A-Phase/B Phase generate total 20,000 counts, Z-Phase generates one signal.
- The B-Phase output has a 90° phase difference with respect to the A-Phase output. Phase A Leads B 90°while motor rotates by CW direction, phase B leads A 90°while motor rotates by CCW direction.

Pulse Output Signal Chart

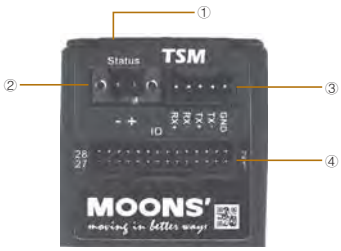


Encoder Output Circuit



■ Connection and Operation(-C CANopen Type)

◇ Names and Functions of Parts

TSM17C	TSM23/24C
	

① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection

▪ LED Error Codes

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

② Power Connector

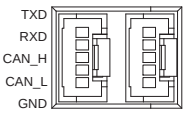
P/N: Weidmuller 1615780000

	Description
+	Power Supply +
-	Power Supply -

③ Communication Connector

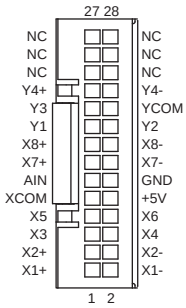
Housing P/N: JST ZER-05V-S
Crimp P/N: JST SZE-002T-PO.3

CANopen Type



Pin.	Description
TXD	RS232 Data Transmit
RXD	RS232 Data Receive
CAN_H	CAN+
CAN_L	CAN-
GND	Ground

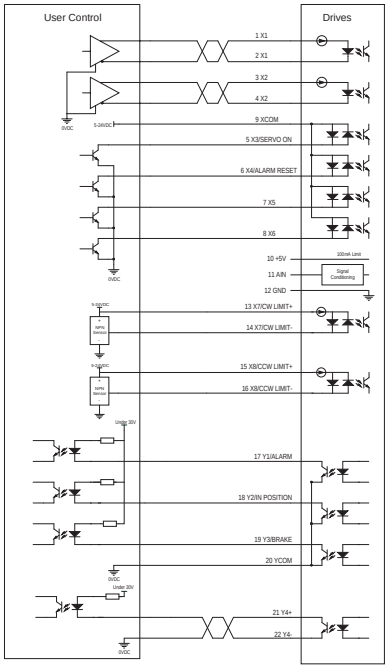
④ I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	X1+	X1 Digital Input
2	X1-	
3	X2+	X2 Digital Input
4	X2-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT
11	AIN	Analog Input
12	GND	Aanlog Ground
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	NC	N/C
24	NC	
25	NC	
26	NC	
27	NC	
28	NC	

◇ Wiring Diagram



◇ Description of Input/Output Signals

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- Pulse singal input range 5-24VDC
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
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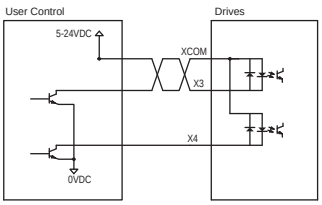
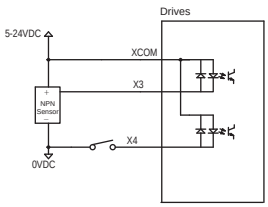
- Digital Input Circuit and Sample Connection

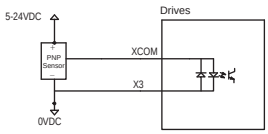
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo ON Input

X3 can be configured as Enable signal to excite the motor.

Alarm Reset Input

X4 can be configured as Reset signal to clear the alarm and turns to normal stutus as Servo OFF.

Caution: Please make sure there's no error in system before you clear an Alarm.

CW/CCW Limit Input

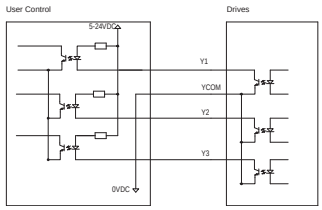
X7 can be configured as CW limit signal input, X8 can be configured as CCW limit signal input.

When either limit signal actives, motor will Servo OFF immidiately and indicate an Alarm.(Unless motors works in Homing mode and defined otherwize)

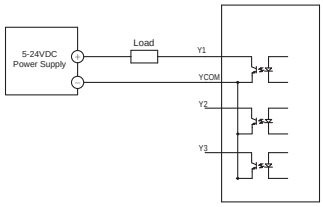
◇ Connecting using Digital Outputs

- Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the red LED will flash.

In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

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Brake Output

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Timing Output

Y4 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°.50 pulses output with one rotation.

Tach Output

Y4 can be configured as Tach signal output, tach output produces pulses relative to the motor position with configurable resolution:100,200,400,800,1600.

Alarm Information

Status Display via LEDs

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown below.

Code		Error
○	Solid green	Motor disabled
○○	Flashing green	Motor enabled
●○	1 red, 1 green	Motor Stall
●○○	1 red, 2 green	Move attempted while drive disabled
●●○	2 red, 1 green	CCW limit
●●○○	2 red, 2 green	CW limit
●●●○	3 red, 1 green	Over temperature
●●●○○	3 red, 2 green	Internal voltage
●●●○○○	3 red, 3 green	Non-volatile memory error
●●●●○	4 red, 1 green	Over voltage
●●●●○○	4 red, 2 green	Under voltage
●●●●○○○	4 red, 3 green	Non-volatile double error
●●●●●○	5 red, 1 green	Over current
●●●●●○○	5 red, 2 green	Current limit
●●●●●●○	6 red, 1 green	Open winding
●●●●●●○○	6 red, 2 green	Encoder failure
●●●●●●●○	7 red, 1 green	Communication error
●●●●●●●○○	7 red, 2 green	Save failed

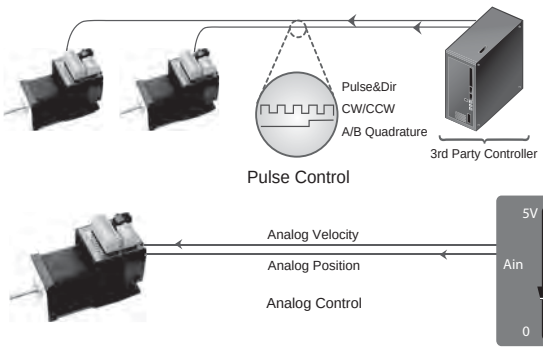
● Show Red; ○ Show Green.

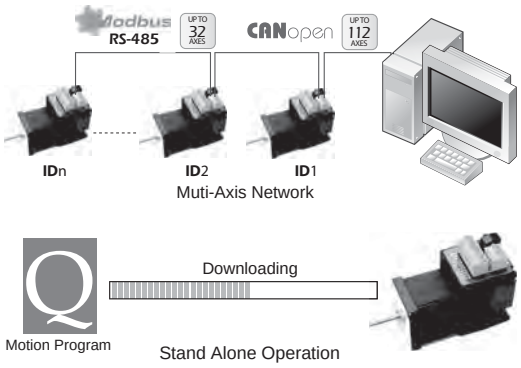
Integrated Step-Servo -SSM Series

The SSM line of integrated **Step-Servo** motors combines servo technology with an integrated motor to create a product with exceptional feature and broad capability.

Features

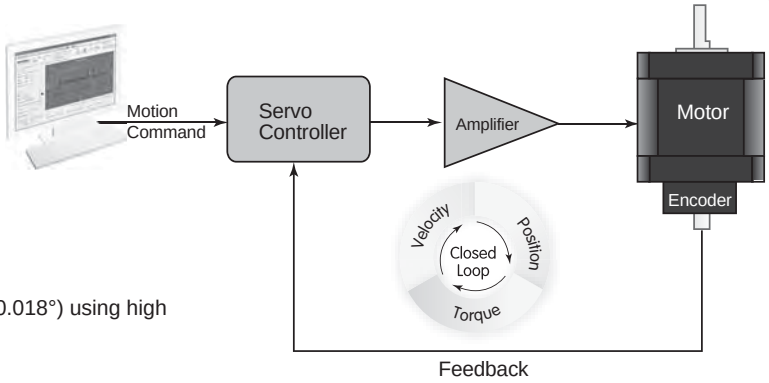
Multi-functional Capability



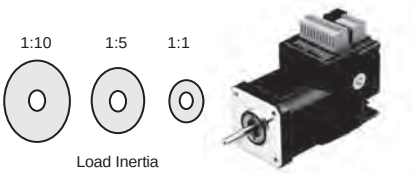


Closed Loop

- Very tight position and velocity control for the most demanding applications
- Robust servo loops that tolerate wide fluctuation in load inertia and frictional loading
- Precise positioning to within ±1 count (0.018°) using high resolution (20000 counts/rev) encoder



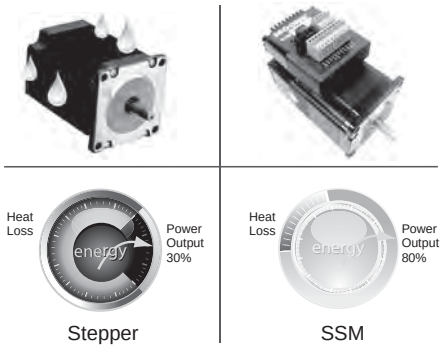
Easy Tuning



- Pre-defined tuning parameters for maximum control performance and stability.
- Easy selection list provides the level of control desired.
- In most cases NO extra manual tuning is required.

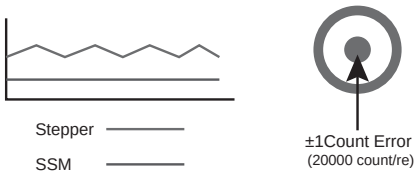
Lower Heating/High Efficiency

- Uses only the current required by the application, generating minimum heat output.
- When stand-still, current can reach nearly zero for extremely low heat output.
- Being able to use almost 100% of torque, allows for more efficient and compact motor usage.

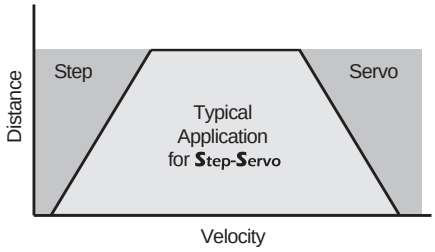


Smooth&Accurate

- Space vector current control with 5000 line high resolution encoder, gives smooth and quiet operation, especially at low speeds.
  ------A feature never found with traditional stepping motors
- High stiffness due to the nature of the stepping motor combined with the highly responsive servo control
  ------Accurate position control both while running and static positioning



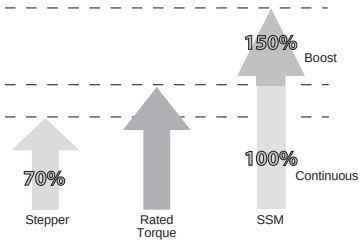
Fast Response



- When performing fast point-to-point moves, the high torque output and advanced servo control provide a very responsive system far exceeding what can be done with a conventional stepper system.

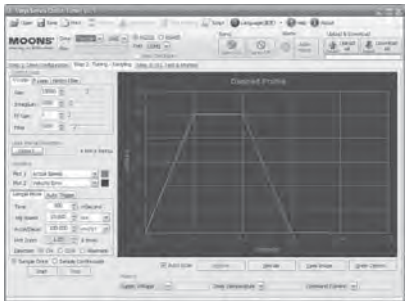
High Torque

- Because the SSM operates in full servo mode, all the available torque of the motor can be used.
- The motor can provide as much as 50% more torque in many applications. High torque capability often eliminates the need for gear reduction.
- Boost torque capability can provide as much as 50% more torque for short, quick moves.



Motion Monitoring

- For difficult control situations where performing a precise move is necessary, the **Step-Servo** Quick Tuner provide an easy to use interface for performing and monitoring the motion profile.
- Many common parameters such as Actual Speed or Position Error can be monitored to evaluate system performance.
- The monitoring is interactive with the servo tuning capability so that optimum performance can be achieved.



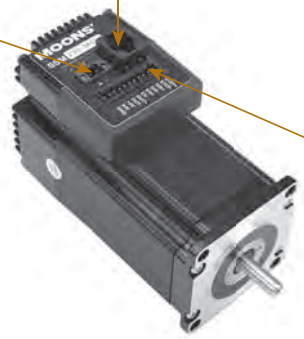
System Wiring

Communications Port:

Model	CANopen	RS-232	RS-485
SSM17	GND, CAN_L, CAN_H, RXD, TXD	RXD, +5V, TXD, GND, GND	GND, TX-, TX+, RX-, RX+
SSM23	GND, RX, TX	RJ11 (GND, TX, RX)	
SSM24	GND, CANL, CANH		

DC Power Supply
SSM17：12 - 48V
SSM23：12 - 70V
SSM24：12 - 70V

MOONS' also offers two matched power supplies for use with the SSM. A 24VDC, 150W(P/N MF150A24AG-V) and a 48VDC 320W(P/N MF320A48AG-V). These power supplies have current over load capability making them ideal for use.
(To use with a switch power supplier, a RC880regen must be connected in system)



I/O Connector:

Model	C Version	S/Q Version
SSM17	IN1+, IN1 -, IN2+, IN2 -, IN3+, IN3 -, OUT+, OUT -, +5V, AIN, GND	STEP+, STEP -, DIR+, DIR -, EN+, EN -, OUT+, OUT -, +5V, AIN, GND
SSM23	IN1+, IN1 -, IN2+, IN2 -, IN3+, IN3 -, OUT+, OUT -	
SSM24		

Numbering System

SSM 17 S-2 A G

- SSM — Step Servo Motor
- 17 — Frame Size 17,23,24
- S — Control: S=Basic Version; Q=Q Programmer (Modbus/RTU Type); C=CANopen
- 2 — Motor Size: 1 = 1Stack; 2 = 2Stack; 3 = 3Stack
- A — Communication: A=RS-232; R=RS-485; C=CANopen
- G — Feedback: G=5000-line encoder

Ordering Information

Model	Torque	Control	RS-232	RS-485	Modbus/RTU	CANopen
SSM17S-1AG	0.28N·m	S	✓			
SSM17S-1RG				✓		
SSM17Q-1AG		Q	✓			
SSM17Q-1RG				✓	✓	
SSM17C-1CG		C				✓
SSM17S-2AG	0.42N·m	S	✓			
SSM17S-2RG				✓		
SSM17Q-2AG		Q	✓			
SSM17Q-2RG				✓	✓	
SSM17C-2CG		C				✓
SSM17S-3AG	0.52N·m	S	✓			
SSM17S-3RG				✓		
SSM17Q-3AG		Q	✓			
SSM17Q-3RG				✓	✓	
SSM17C-3CG		C				✓

Model	Torque	Control	RS-232	RS-485	Modbus/RTU	CANopen
SSM23S-2AG	1.0N·m	S	✓			
SSM23S-2RG				✓		
SSM23Q-2AG		Q	✓			
SSM23Q-2RG				✓	✓	
SSM23C-2CG		C				✓
SSM23S-3AG	1.5N·m	S	✓			
SSM23S-3RG				✓		
SSM23Q-3AG		Q	✓			
SSM23Q-3RG				✓	✓	
SSM23C-3CG		C				✓
SSM24S-3AG	2.4N·m	S	✓			
SSM24S-3RG				✓		
SSM24Q-3AG		Q	✓			
SSM24Q-3RG				✓	✓	
SSM24C-3CG		C				✓

SSM17 - Integrated Step-Servo

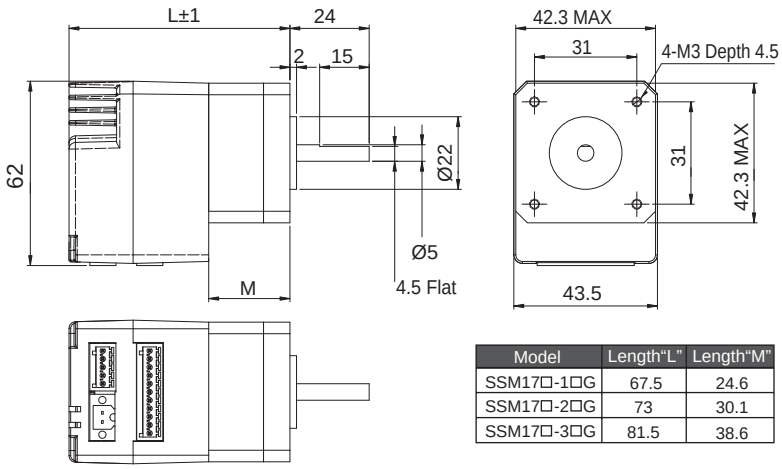
Features

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	SSM17□-1□G: Up to 0.28N•m Continuous(0.35 N•m Boost) SSM17□-2□G: Up to 0.42N•m Continuous(0.52 N•m Boost) SSM17□-3□G: Up to 0.52N•m Continuous(0.68 N•m Boost)
Power Supply	External 12 - 48 VDC power supply required
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)

CE RoHS

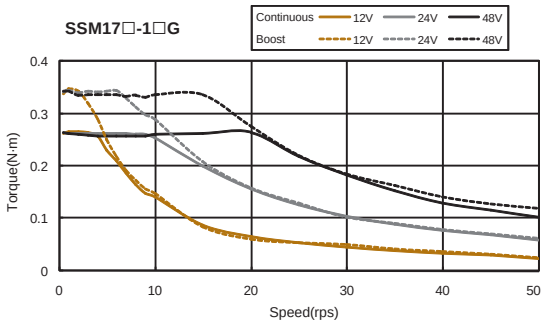
Controller	
Electronic Gearing	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Resolution	20000 counts/rev
Speed Range	Up to 4800rpm
Filters	S/Q Model: Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter C Model: PID filter, Notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	SSM17S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) SSM17Q: All SSM17S modes of operation plus stored Q program execution SSM17C: CANopen slave node plus stored Q Program execution
Digital Inputs	**S/Q Model:** Digital Inputs Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function**:** Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), or general purpose input **DIR+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function**:** Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), or general purpose input **EN+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function**:** Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), or general purpose input **C Model:** Digital Inputs Adjustable bandwidth digital noise rejection filter on all inputs **IN1+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function**:** CW limit, CW jog, or general purpose input **IN2+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CCW limit, CCW jog, or general purpose input **IN3+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function**:** general purpose input
Digital Output	**OUT+/-:** Optically isolated, 30V/100 mA max. Function**:** Fault, motion, tach, in position, brake, or general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits
Communication Interface	S Model: RS-232 or RS-485 Q Model: RS-232 , RS-485 or Modbus/RTU C Model: CANOpen, RS-232
Physical	
Ambilent Temperature	0 - 40 °C (32 -104°F)When mounted to a suitable heatsink
Humdity	90% Max., non-condensing
Mass	SSM17□-1□G: 280 g SSM17□-2□G: 360 g SSM17□-3□G: 440 g
Rotor Inertia	SSM17□-1□G: 38 g•cm^2 SSM17□-2□G: 57 g•cm^2 SSM17□-3□G: 82 g•cm^2

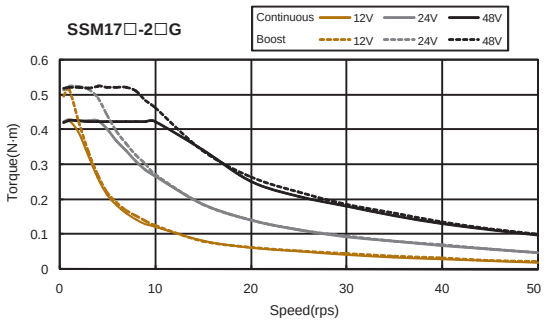
Dimensions (Unit:mm)

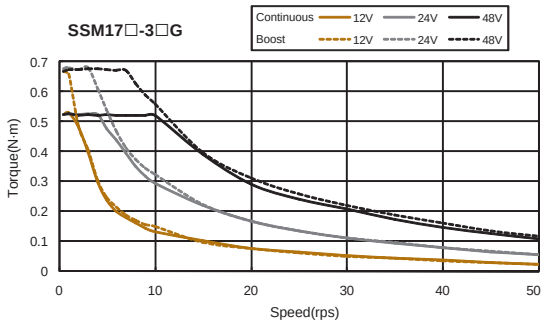


Model	Length"L"	Length"M"
SSM17□-1□G	67.5	24.6
SSM17□-2□G	73	30.1
SSM17□-3□G	81.5	38.6

Torque Curves







SSM23 - Integrated Step-Servo

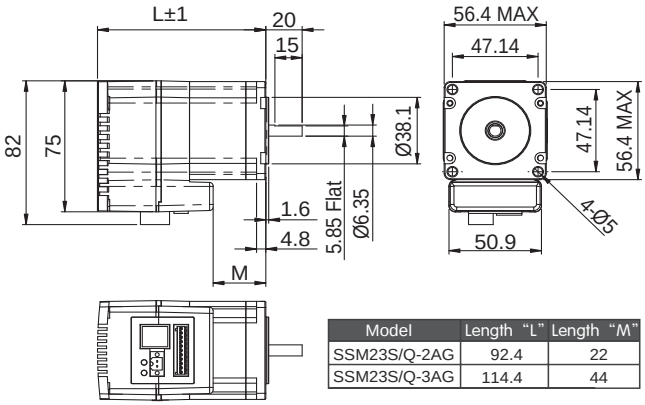
Features

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	SSM23□-2□G: Up to 1.0N•m Continuous(1.3 N•m Boost) SSM23□-3□G: Up to 1.5N•m Continuous(2.0 N•m Boost)
Power Supply	External 12 - 70 VDC power supply required
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)

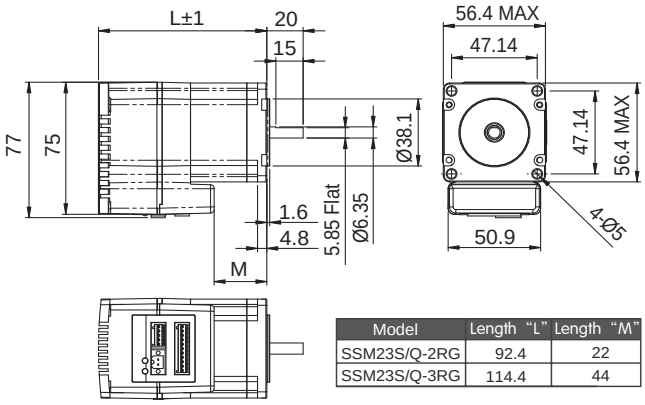
CE RoHS

Controller	
Electronic Gearing	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Resolution	20000 counts/rev
Speed Range	Up to 4800 rpm
Filters	S/Q Model: Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter C Model: PID filter, Notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	SSM23S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) SSM23Q: All SSM23S modes of operation plus stored Q program execution SSM23C: CANopen slave node plus stored Q Program execution
Digital Inputs	**S/Q Model:** Digital Inputs Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function**:** Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), or general purpose input **DIR+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function**:** Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), or general purpose input **EN+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function**:** Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), or general purpose input **C Model:** Digital Inputs Adjustable bandwidth digital noise rejection filter on all inputs **IN1+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function**:** CW limit, CW jog, or general purpose input **IN2+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CCW limit, CCW jog, or general purpose input **IN3+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function**:** general purpose input
Digital Output	**OUT+/-**: Optically isolated, 30V/100 mA max. Function: Fault, motion, tach, in position, brake, or general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits
Communication Interface	S Model: RS-232 or RS-485 Q Model: RS-232 , RS-485 or Modbus/RTU C Model: CANOpen, RS-232
Physical	
Ambilent Temperature	0 - 40 °C (32 -104°F) When mounted to a suitable heatsink
Humdity	90% Max., non-condensing
Mass	SSM23□-2□G□: 850 g SSM23□-3□G□: 1200 g
Rotor Inertia	SSM23□-2□G□: 260 g•cm^2 SSM23□-3□G□: 460 g•cm^2

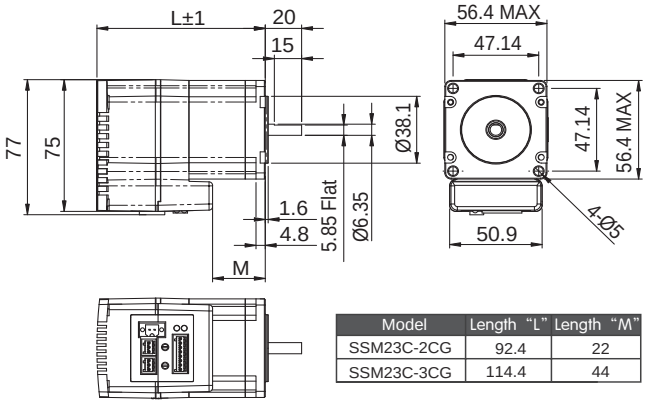
Dimensions (Unit:mm)



Model	Length "L"	Length "M"
SSM23S/Q-2AG	92.4	22
SSM23S/Q-3AG	114.4	44

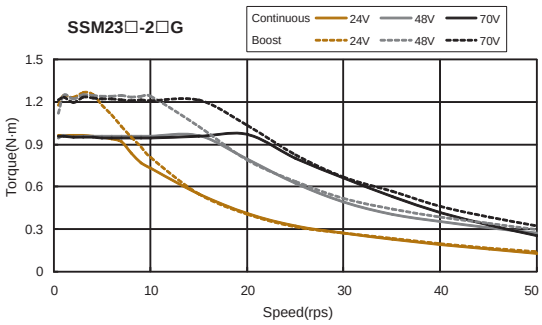


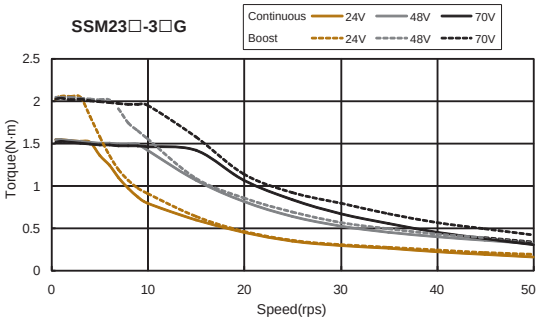
Model	Length "L"	Length "M"
SSM23S/Q-2RG	92.4	22
SSM23S/Q-3RG	114.4	44



Model	Length "L"	Length "M"
SSM23C-2CG	92.4	22
SSM23C-3CG	114.4	44

Torque Curves





SSM24 - Integrated Step-Servo

Features

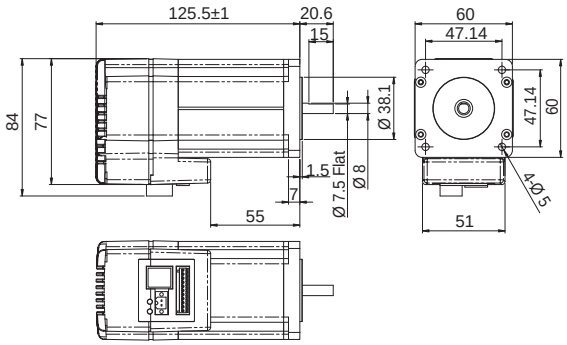
Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	SSM24□-3□G: Up to 2.4N•m Continuous(3.0 N•m Boost)
Power Supply	External 12 - 70 VDC power supply required
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)

CE RoHS

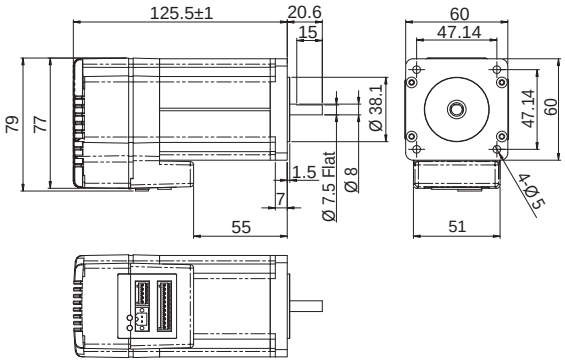
Controller	
Electronic Gearing	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Resolution	20000 counts/rev
Speed Range	Up to 4800 rpm
Filters	S/Q Type: Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter C Type: PID filter, Notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	SSM24S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) SSM24Q: All SSM24S modes of operation plus stored Q program execution SSM24C: CANopen CiA 301 CiA 402, plus runing stored Q programs via MOONS'-specific CANopen objects.
Digital Inputs	**S/Q** Type: Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), general purpose input **DIR+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), general purpose input **EN+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), general purpose input **C Type:** **IN1+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CW limit, CW jog, general purpose input **IN2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CCW limit, CCW jog, general purpose input **IN3+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: CCW limit, CCW jog, general purpose input
Digital Output	**OUT+/-**: Optically isolated, 30V/100 mA max. Function: Fault, motion, tach, in position, brake, or general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits
Communication Interface	S Model: RS-232 or RS-485 Q Model: RS-232 , RS-485 or Modbus/RTU C Model: CANOpen, RS-232
Physical	
Ambient Temperature	0 to 40°C (32 to 104°F) When mounted to a suitable heatsink
Humdity	90% Max., non-condensing
Mass	SSM24□-3□G: 1580 g
Rotor Inertia	SSM24□-3□G: 900 g•cm^2

Dimensions (Unit:mm)

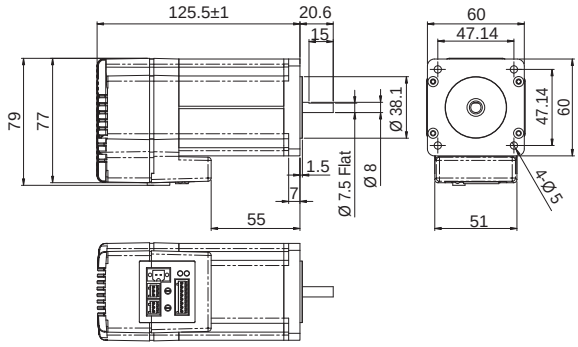
SSM24S/Q-3AG



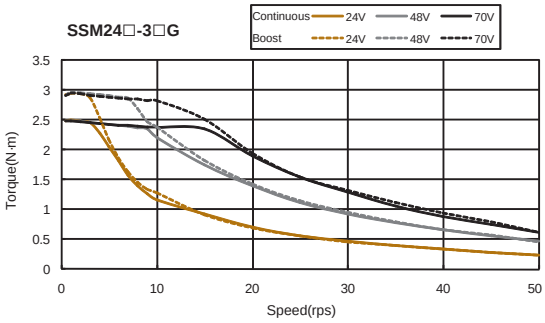
SSM24S/Q-3RG



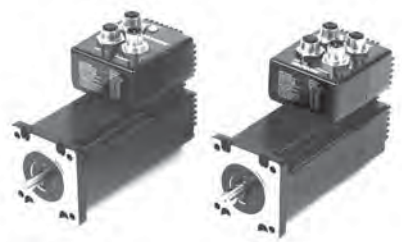
SSM24C-3CG



Torque Curves

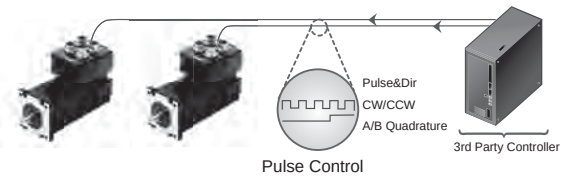


IP65 Type Integrated Step-Servo-TXM Series

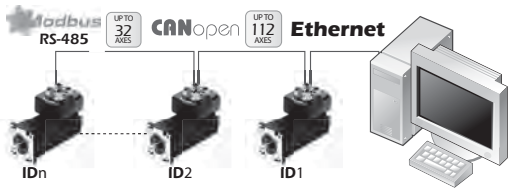


Features

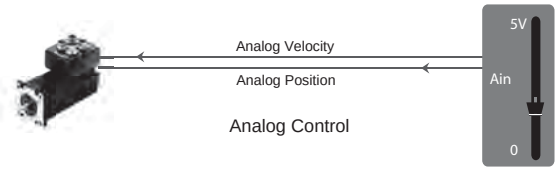
Multi-functional Capability



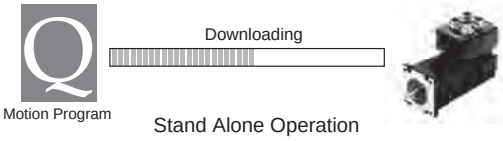
Pulse Control



Muti-Axis Network



Analog Control

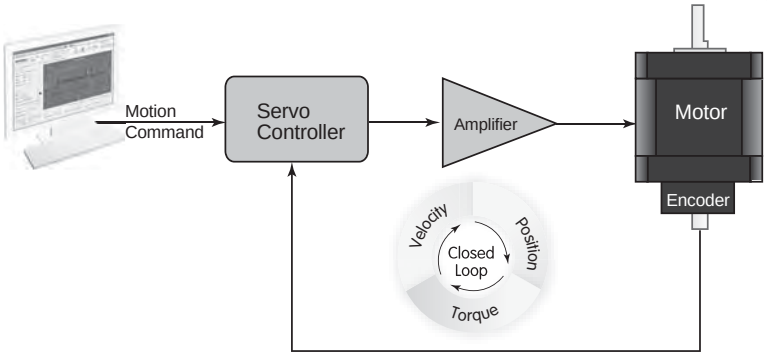


Motion Program

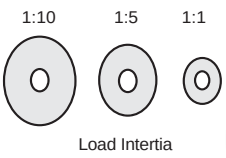
Stand Alone Operation

Closed Loop

- Very tight position and velocity control for the most demanding applications.
- Robust servo loops that tolerate wide fluctuation in load inertia and frictional loading.
- Precise positioning to within ±1 count (0.018°) using high resolution(20000 counts/rev) encoder.



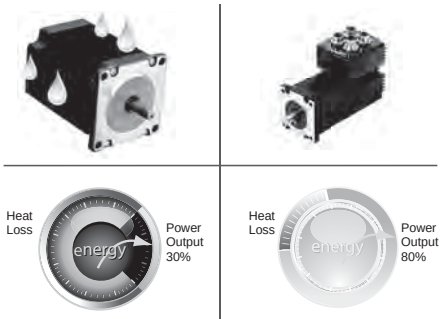
Easy Tuning



- Pre-defined tuning parameters for maximum control performance and stability.
- Easy selection list provides the level of control desired.
- In most cases NO extra manual tuning is required.

Lower Heating/High Efficiency

- Uses only the current required by the application, generating minimum heat output.
- When stand-still, current can reach nearly zero for extremely low heat output.
- Being able to use almost 100% of torque, allows for more efficient and compact motor usage.



Stepper

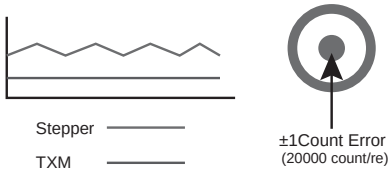
TXM

Smooth & Accurate

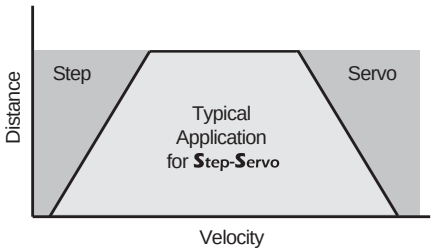
- Space vector current control with 5000 line high resolution encoder, gives smooth and quiet operation, especially at low speeds.

  ------A feature never found with traditional stepping motors
- High stiffness due to the nature of the stepper motors combined with the highly responsive servo control

  ------Accurate position control both while running and static positioning



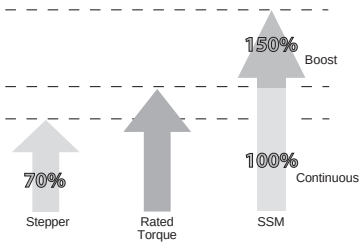
Fast Response



- When performing fast point-to-point moves, the high torque output and advanced servo control provides a very responsive system far exceeding what can be done with a conventional stepper system.

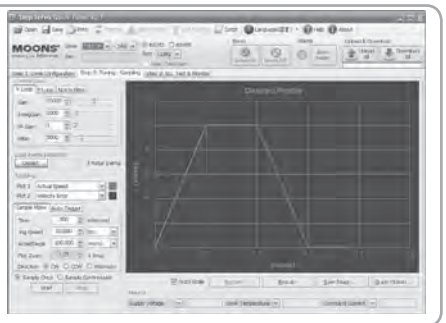
High Torque

- Because the TXM operates in full servo mode, all the available torque of the motor can be used.
- The motor can provide as much as 50% more torque in many applications. High torque capability often eliminates the need for gear reduction.
- Boost torque capability can provide as much as 50% more torque for short, quick moves.



Motion Monitoring

- For difficult control situations where performing a precise move is necessary, the **Step-Servo** Quick Tuner provide an easy to use interface for performing and monitoring the motion profile.
- Many common parameters such as Actual Speed or Position Error can be monitored to evaluate system performance.
- The monitoring is interactive with the servo tuning capability so that optimum performance can be achieved.



TXM24 - IP65 Type Integrated Step-Servo

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	TXM24□-3□G: Up to 2.4N•m Continuous(3.0 N•m Boost)
Power Supply	External 12 - 70 VDC power supply required
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)

Controller	
Electronic Gearing	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Resolution	20000 counts/rev
Speed Range	Up to 3600 rpm
Filters	S/Q Type: Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter C/IP Type: PID filter, Notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	TXM24S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) TXM24Q: All TXM24S modes of operation plus stored Q program execution TXM24C: CANopen CiA 301 CiA 402, plus running stored Q programs via MOONS'-specific CANopen objects TXM24IP: Ethernet/IP, plus running stored Q programs
Digital Inputs	**S/Q/IP** Type: Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), general purpose input **DIR+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), general purpose input **EN+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode),general purpose input **C Type:** **IN1+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CW limit, CW jog,general purpose input **IN2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CCW limit, CCW jog, general purpose input **IN3, IN4, IN5:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: CCW limit, CCW jog, general purpose input
Digital Output	**S/Q/IP** Type: **OUT+/-**: Optically isolated, 30V/100 mA max. Function: Fault, motion, tach, in position, brake, or general purpose programmable **C Type:** **OUT1**: Optically isolated, 30V/100 mA max. Function: Fault, general purpose programmable **OUT2**: Optically isolated, 30V/100 mA max. Function: Motion, tach, in position, general purpose programmable **OUT3**: Optically isolated, 30V/100 mA max. Function: Brake, general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits.(Not present on TXM24C).
Communication Interface	S Type: RS-232, RS-485 or Ethernet Q Type: RS-232, RS-485, Modbus/RTU or Ethernet C Type: CANOpen & RS-232 IP Type: EtherNet/IP
Physical	
Ambient Temperature	0 to 40°C (32 to 104°F) When mounted to a suitable heat sink
Humidity	90% Max., non-condensing
Mass	TXM24□-3□G: approximately 1800 g
Rotor Inertia	TXM24□-3□G: 900 g•cm^2

Connection interface

Power Port

Pin.	Description
1	Power Supply+
2	Power Supply-
3	Power Supply+
4	Power Supply-

RS-232 Communication Port

Pin.	Description
1	Data Receive RX
2	+5V 50mA
3	Data Transmit TX
4	GND
5	NC

RS-485 or Modbus Communication Port

Pin.	Description
1	Data Receive RX+
2	Data Receive RX-
3	Data Transmit TX+
4	Data Transmit TX-
5	GND

CAN Communication Port

Pin.	Description
1	Serial Transmit TX
2	Serial Receive RX
3	GND
4	CAN H
5	CAN L

Ethernet Communication Port

Pin.	Description
1	Data Transmit TX+
2	Data Receive RX+
3	Data Transmit TX-
4	Data Receive RX-

I/O Port

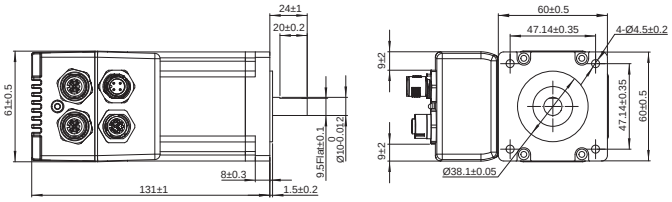
S/Q/IP Type		C Type	
Pin.	Description	Pin.	Description
1	STEP+	1	Input X1+
3	STEP -	3	Input X1 -
5	DIR+	6	Input X4
8	DIR-	4	Input X3
6	EN+	5	Input X2+
4	EN-	8	Input X2 -
11	OUT +	7	Input X5
12	OUT-	10	XCOM
9	+5V 50mA	11	Output Y1
2	N/C	12	Output Y2
10	AIN	9	Output Y3
7	GND	2	YCOM

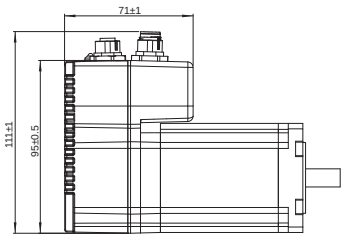
Numbering System

TXM 24 S-3 A G

- Series
- Frame Size
  Nema 24
- Control
  S=Basic Type
  Q=Q Program Type
  (Modbus/RTU Type)
  C=CANopen Type
  IP=Ethernet/IP Type
- Motor Size
  3 = 3 Stack
- Communication
  A=RS-232
  R=RS-485
  C=CANopen
  E=Ethernet
- Feedback
  G=5000 line encoder

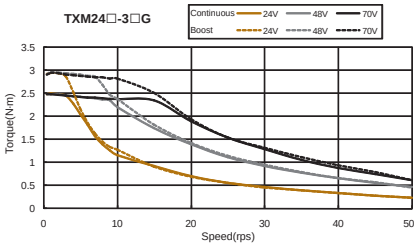
Dimensions(Unit:mm)





* 8 mm diameter shaft available per request.

Torque Curve



Ordering Information

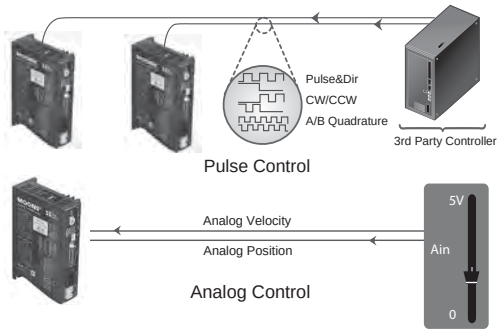
Model	Torque	Control	RS-232	RS-485	Modbus/RTU	CANopen	Ethernet	EtherNet/IP	Daisy Chain
TXM24S-3AG	2.4N·m	S	✓						
TXM24S-3RG				✓					✓
TXM24S-3EG							✓		
TXM24Q-3AG		Q	✓						
TXM24Q-3RG				✓	✓				✓
TXM24Q-3EG							✓		
TXM24C-3CG		C	✓			✓			✓
TXM24IP-3EG		IP						✓	

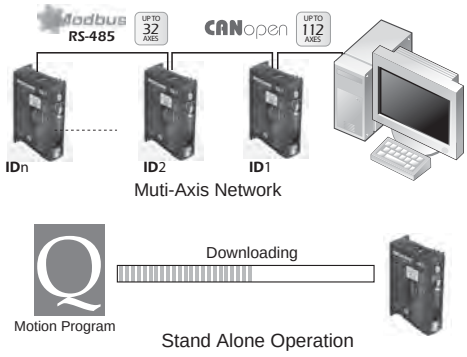
Step-Servo Motor & Drive Package-SS Series

The **Step-Servo** is an innovative revolution for the world of stepper motor, it enhances the stepper motors with servo technology to create a product with exceptional feature and broad capability.

Features

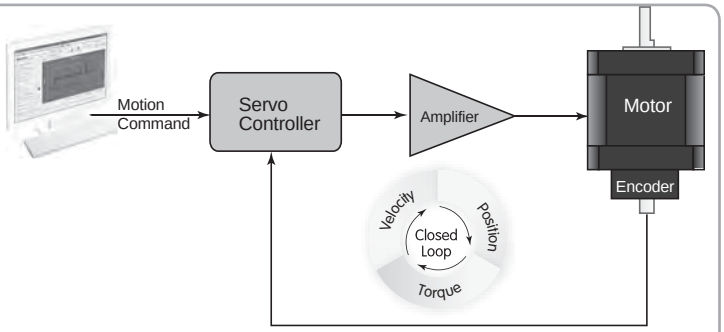
Multi-functional Capability





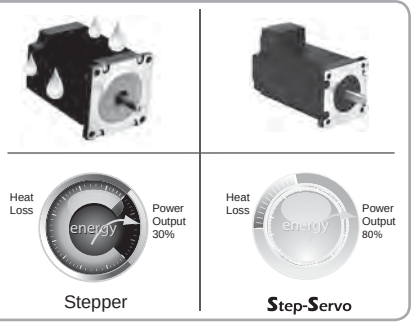
Closed Loop

- Very tight position and velocity control for the most demanding applications.
- Robust servo loops that tolerate wide fluctuation in load inertia and frictional loading.
- Precise positioning to within ±1 count (0.018°) using high resolution(20000 counts/rev) encoder.



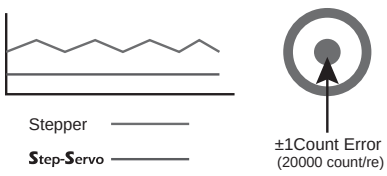
Low Heating/High Efficiency

- Uses only the current required by the application, generating minimum heat output.
- When stand-still, current can reach nearly zero for extremely low heat output.
- Being able to use almost 100% of torque, allows for more efficient and compact motor usage.

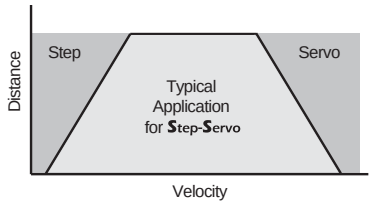


Smooth & Accurate

- Space vector current control with 5000 line high resolution encoder, gives smooth and quiet operation, especially at low speeds.
  ------A feature never found with traditional stepping motors
- High stiffness due to the nature of the stepping motor combined with the highly responsive servo control
  ------Accurate position control both while running and static positioning



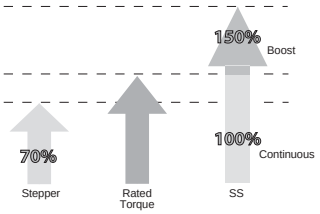
Fast Response



- When performing fast point-to-point moves, the high torque output and advanced servo control provides a very responsive system far exceeding what can be done with a conventional stepper system.

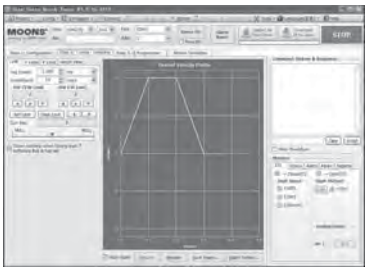
High Torque

- Because the **Step-Servo** operates in full servo mode, all the available torque of the motor can be used.
- The motor can provide as much as 50% more torque in many applications. High torque capability often eliminates the need for gear reduction.
- Boost torque capability can provide as much as 50% more torque for short, quick moves.

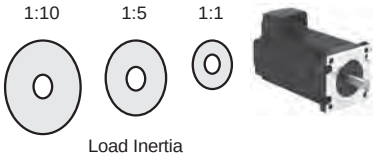


Motion Monitoring

- For difficult control situations where performing a precise move is necessary, the **Step-Servo** Quick Tuner provide an easy to use interface for performing and monitoring the motion profile.
- Many common parameters such as Actual Speed or Position Error can be monitored to evaluate system performance.
- The monitoring is interactive with the servo tuning capability so that optimum performance can be achieved.



Easy Tunning



- Pre-defined tuning parameters for maximum control performance and stability.
- Easy selection list provides the level of control desired.
- In most cases NO extra manual tuning is required.

Other Key Features

- Up to 8 digital inputs, 4 digital outputs and 2 analog inputs for S/Q/C type
- A/B/Z differential encoder signal output supported for P/R type
- Automatic load inertia detection
- On board daisy chain connection for field bus control(RS-485, **Modbus/RTU & CANopen**)
- Multiple homing methods for S/Q type
- Software limit for S/Q type
- Built-in position table up to 63 points for S type

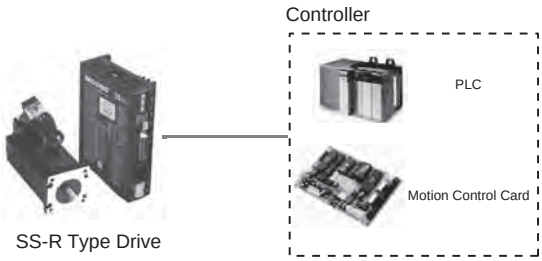
◇ Control Modes

-R Switch Setting Pulse Input type

Controlled via pulse generator.

Main Features

- Accepts three types of pulse signal input as Pulse&Direction, CW/CCW and A/B Quadrature
- Encoder signal output, A/B/Z differential
- Configutaion and Tuning via switches

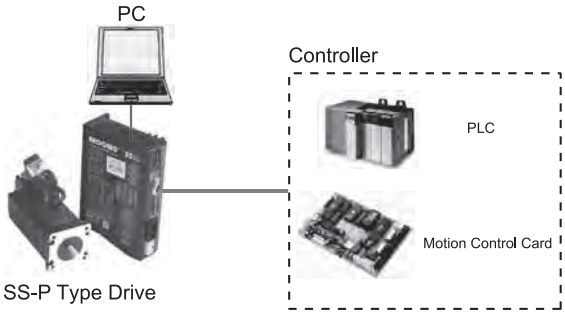


-P Software Setting Pulse Input type

Controlled via pulse generator.

Main Features

- Accepts three types of pulse signal input as Pulse&Direction, CW/CCW and A/B Quadrature
- Encoder signal output, A/B/Z differential

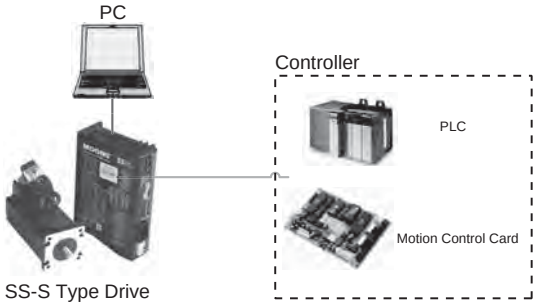


-S Basic type with series communication

Controlled via pulse signals, analog signal or MOONS' SCL streaming series commands.

Main Features

- Pulse control
- Analog control
- Host real time control using SCL via RS-232/RS-485
- Up to 32 axes per channel for RS-485
- Support Position Table(up to 63 points)

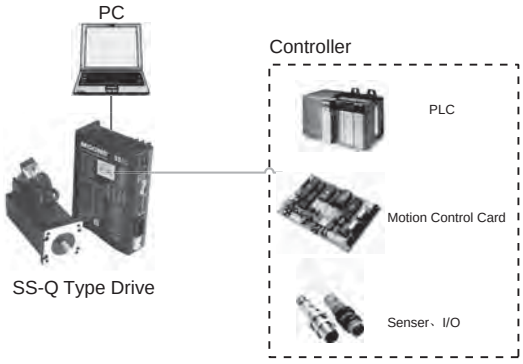


-Q Built-in programmable motion controller (Includes Modbus/RTU type)

Run stand-alone with sophisticated and functional programs. Commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

Main Features

- Stand-alone operation plus Serial host control
- Math operations
- Register manipulation
- Multi-tasking
- With all features in S type
- Modbus/RTU network, up to 32 axes per channel

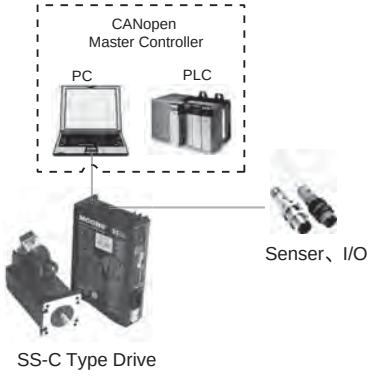


-C CANopen type

Operates on a CANopen communication network and conforms to CiA301 and CiA402. It supports runing stored Q programs via MOONS'-specific CANopen objects.

Main Features

- CANopen network
- Up to 112 axes per channel
- Objects for Q programming

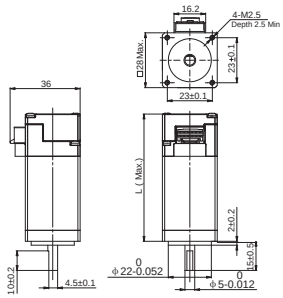


Dimensions(Unit:mm)

Visit www.moonsindustries.com to get the 3D drawing.

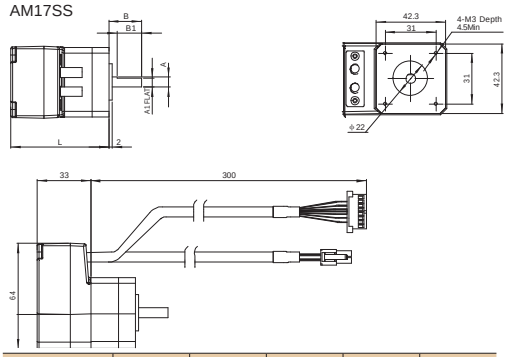
Motor

AM11SS



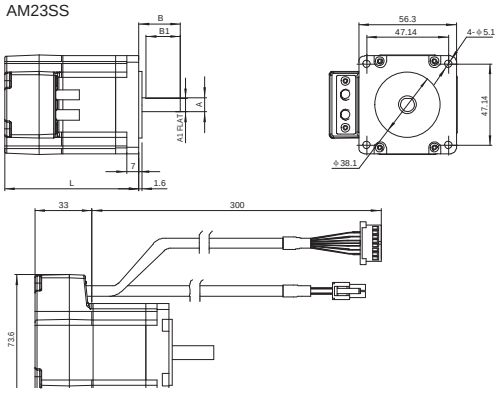
Motor Type	L
AM11SS1DMA	43.8
AM11SS2DMA	52.9
AM11SS3DMA	64.1

AM17SS



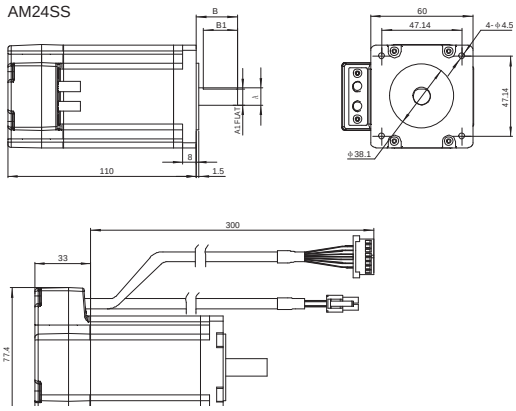
Motor Type	A	A1	B	B1	L
AM17SS1DGA	φ6	5.5	20	15	59.5
AM17SS1DGB	φ5	4.5	24	15	59.5
AM17SS2DGA	φ6	5.5	20	15	65
AM17SS2DGB	φ5	4.5	24	15	65
AM17SS3DGA	φ6	5.5	20	15	73.5
AM17SS3DGB	φ5	4.5	24	15	73.5
AM17SS4DGA	φ6	5.5	20	15	89
AM17SS4DGB	φ5	4.5	24	15	89

AM23SS



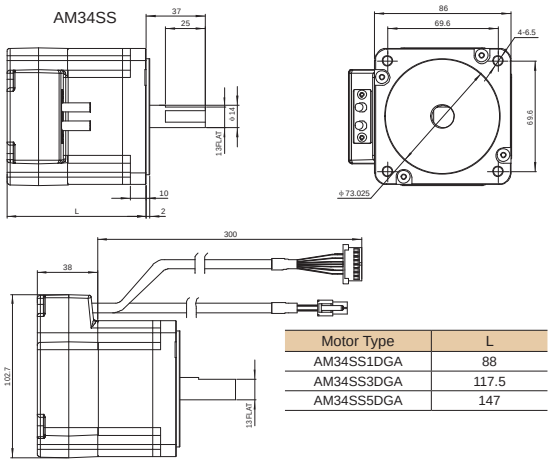
Motor Type	A	A1	B	B1	L
AM23SS2DGA	φ8	7.5	24	20	77.5
AM23SS2DGB	φ6.35	5.85	20	15	77.5
AM23SS3DGA	φ8	7.5	24	20	99.5
AM23SS3DGB	φ6.35	5.85	20	15	99.5

AM24SS



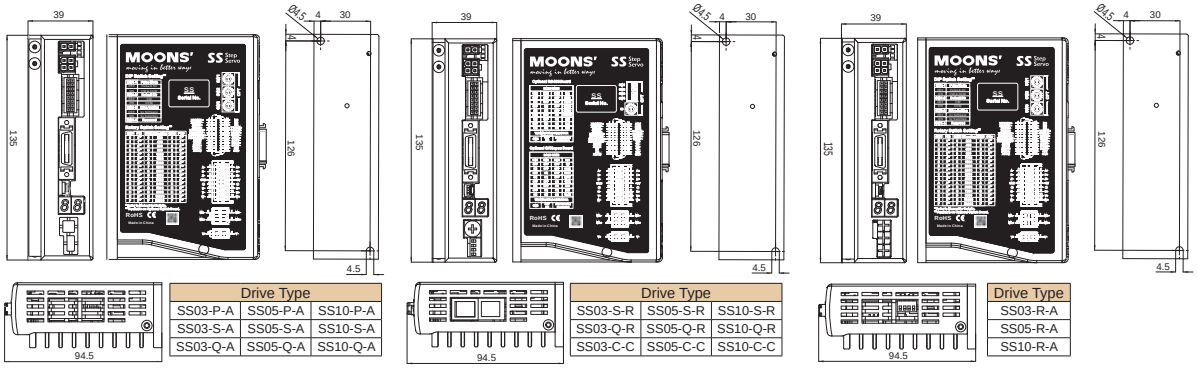
Motor Type	A	A1	B	B1
AM24SS3DGA	φ10	9.5	24	20
AM24SS3DGB	φ8	7.5	20	15

AM34SS



Motor Type	L
AM34SS1DGA	88
AM34SS3DGA	117.5
AM34SS5DGA	147

Drive



Drive Type		
SS03-P-A	SS05-P-A	SS10-P-A
SS03-S-A	SS05-S-A	SS10-S-A
SS03-Q-A	SS05-Q-A	SS10-Q-A

Drive Type		
SS03-S-R	SS05-S-R	SS10-S-R
SS03-Q-R	SS05-Q-R	SS10-Q-R
SS03-C-C	SS05-C-C	SS10-C-C

Drive Type
SS03-R-A
SS05-R-A
SS10-R-A

Numbering System-Motor

AM17 SS 1 D G A

- Frame Size: 11,17,23,24,34
- Step Servo
- Motor Size: 1 = 1Stack, 2 = 2Stack, 3 = 3Stack, 4 = 4Stack, 5 = 5Stack
- D=DC Input
- Encoder: G=5000-Line, M=1024-Line
- Mechanical Option
  - A=Output shaft size: 11: ϕ5, 17: ϕ6, 23: ϕ8, 24: ϕ10, 34: ϕ14
  - B=Output shaft size: 17: ϕ5, 23: ϕ6.35, 24: ϕ8

Numbering System-Drive

SS 03 P - A

- Step Servo
- Output Current: 03-3A, 05-5A, 10-10A
- R=Switch Setting Type, P=Pulse Input Type, S=Basic Type, Q=Q Type(Modbus/RTU Type), C=CANopen Type
- A=RS-232, R=RS-485, C=CANopen

Ordering Information

Control	Drive Type	Motor Type	Torque	Control	Drive Type	Motor Type	Torque
R Type Pulse Input Type Selectable Switch & RS232 Software 6 Digital Inputs 2 Digital Outputs Encoder Output	SS03-R-A	AM11SS1DMA	0.065N·m	P Type Pulse Input Type RS232 Software 6 Digital Inputs 2 Digital Outputs Encoder Output	SS03-P-A	AM11SS1DMA	0.065N·m
		AM11SS2DMA	0.08N·m			AM11SS2DMA	0.08N·m
		AM11SS3DMA	0.125N·m			AM11SS3DMA	0.125N·m
	SS03-R-A / SS05-R-A	AM17SS1DG□	0.3N·m		SS03-P-A / SS05-P-A	AM17SS1DG□	0.3N·m
		AM17SS2DG□	0.5N·m			AM17SS2DG□	0.5N·m
		AM17SS3DG□	0.6N·m			AM17SS3DG□	0.6N·m
		AM17SS4DG□	0.75N·m			AM17SS4DG□	0.75N·m
	SS05-R-A	AM23SS2DG□	0.9N·m		SS05-P-A	AM23SS2DG□	0.9N·m
		AM23SS3DG□	1.5N·m			AM23SS3DG□	1.5N·m
	SS10-R-A	AM24SS3DG□	2.5N·m		SS10-P-A	AM24SS3DG□	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m			AM34SS5DGA	8.0N·m

Control	Drive Type	Motor Type	Torque	Control	Drive Type	Motor Type	Torque
S Type Basic Type RS232 Communication 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-S-A	AM11SS1DMA	0.065N·m	S Type Basic Type RS485 Communication 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-S-R	AM11SS1DMA	0.065N·m
		AM11SS2DMA	0.08N·m			AM11SS2DMA	0.08N·m
		AM11SS3DMA	0.125N·m			AM11SS3DMA	0.125N·m
	SS03-S-A / SS05-S-A	AM17SS1DG□	0.3N·m		SS03-S-R / SS05-S-R	AM17SS1DG□	0.3N·m
		AM17SS2DG□	0.5N·m			AM17SS2DG□	0.5N·m
		AM17SS3DG□	0.6N·m			AM17SS3DG□	0.6N·m
		AM17SS4DG□	0.75N·m			AM17SS4DG□	0.75N·m
	SS05-S-A	AM23SS2DG□	0.9N·m		SS05-S-R	AM23SS2DG□	0.9N·m
		AM23SS3DG□	1.5N·m			AM23SS3DG□	1.5N·m
	SS10-S-A	AM24SS3DG□	2.5N·m		SS10-S-R	AM24SS3DG□	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m			AM34SS5DGA	8.0N·m

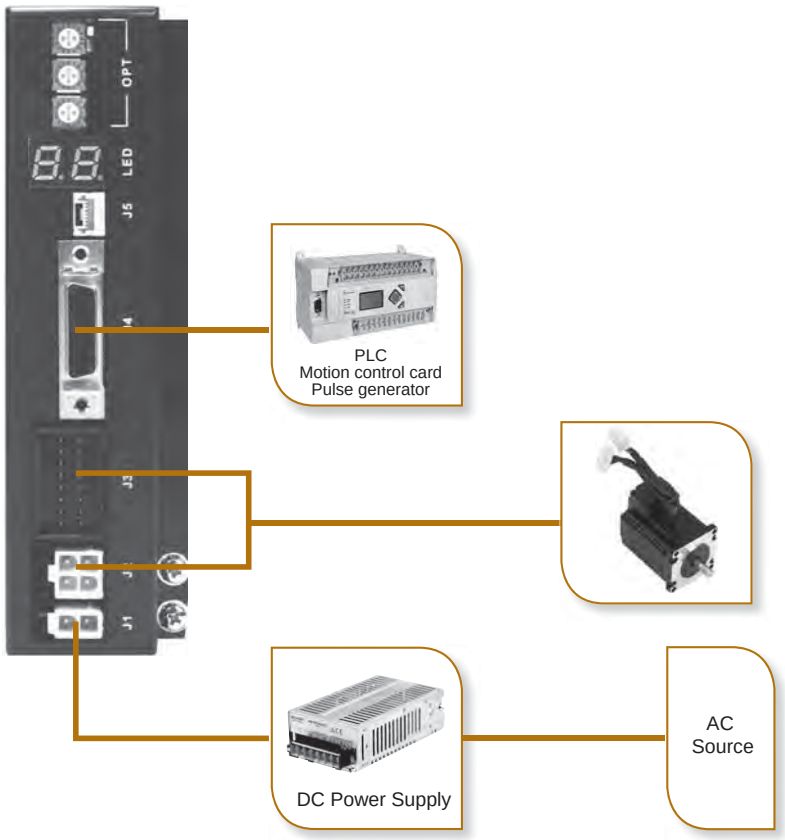
Control	Drive Type	Motor Type	Torque	Control	Drive Type	Motor Type	Torque
Q Type Programm Type RS232 Communication Modbus/RTU 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-Q-A	AM11SS1DMA	0.065N·m	Q Type Programm Type RS485 Communication Modbus/RTU 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-Q-R	AM11SS1DMA	0.065N·m
		AM11SS2DMA	0.08N·m			AM11SS2DMA	0.08N·m
		AM11SS3DMA	0.125N·m			AM11SS3DMA	0.125N·m
	SS03-Q-A / SS05-Q-A	AM17SS1DG□	0.3N·m		SS03-Q-R / SS05-Q-R	AM17SS1DG□	0.3N·m
		AM17SS2DG□	0.5N·m			AM17SS2DG□	0.5N·m
		AM17SS3DG□	0.6N·m			AM17SS3DG□	0.6N·m
		AM17SS4DG□	0.75N·m			AM17SS4DG□	0.75N·m
	SS05-Q-A	AM23SS2DG□	0.9N·m		SS05-Q-R	AM23SS2DG□	0.9N·m
		AM23SS3DG□	1.5N·m			AM23SS3DG□	1.5N·m
	SS10-Q-A	AM24SS3DG□	2.5N·m		SS10-Q-R	AM24SS3DG□	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m			AM34SS5DGA	8.0N·m

Control	Drive Type	Motor Type	Torque
C Type CANopen 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-C-C	AM11SS1DMA	0.065N·m
		AM11SS2DMA	0.08N·m
		AM11SS3DMA	0.125N·m
	SS03-C-C / SS05-C-C	AM17SS1DG□	0.3N·m
		AM17SS2DG□	0.5N·m
		AM17SS3DG□	0.6N·m
		AM17SS4DG□	0.75N·m
	SS05-C-C	AM23SS2DG□	0.9N·m
		AM23SS3DG□	1.5N·m
	SS10-C-C	AM24SS3DG□	2.5N·m
		AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m

□: Enter A(Enhanced Shaft) or B(Standard) in the box(□) within the model name

System configuration

◇ -R Pulse input type, switch setting



Ordering Information

150W P/N: MF150A24AG-V
320W P/N: MF320A48AG-V

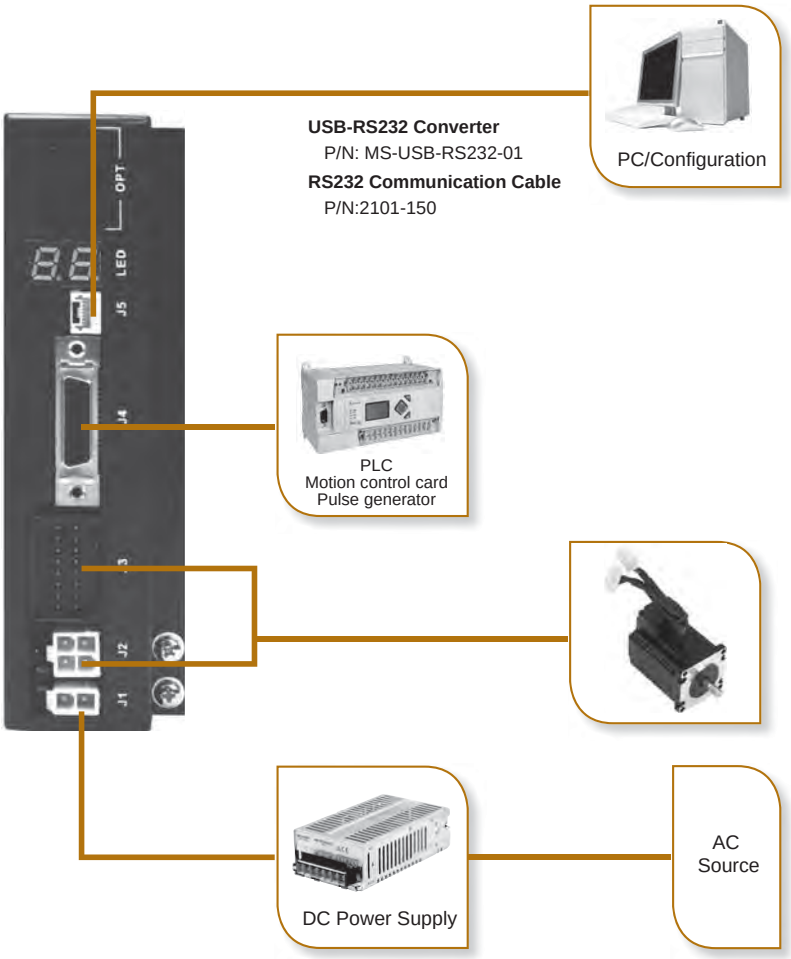
◇ Stand Accessories

P/N	Catagory	Technical Specification
1103-200	Cable	Power Supply Cable, 2M
2101-150	Cable	RS232 Communication Cable, 1.5M

◇ Optional Accessories

P/N	Catagory	Technical Specification
2103-100	Cable	AM17/23/24/34SS Motor Extension Cable, 1M
2103-300	Cable	AM17/23/24/34SS Motor Extension Cable, M
2103-500	Cable	AM17/23/24/34SS Motor Extension Cable, 5M
2103-1000	Cable	AM17/23/24/34SS Motor Extension Cable, 10M
2109-100	Cable	AM11SS Motor Extension Cable, 1M
2109-300	Cable	AM11SS Motor Extension Cable, 3M
2109-500	Cable	AM11SS Motor Extension Cable, 5M
2109-1000	Cable	AM11SS Motor Extension Cable, 10M
2104-100	Cable	AM17/23/24/34SS Encoder Extension Cable, 1M
2104-300	Cable	AM17/23/24/34SS Encoder Extension Cable, 3M
2104-500	Cable	AM17/23/24/34SS Encoder Extension Cable, 5M
2104-1000	Cable	AM17/23/24/34SS Encoder Extension Cable, 10M
2108-100	Cable	AM11SS Encoder Extension Cable, 1M
2108-300	Cable	AM11SS Encoder Extension Cable, 3M
2108-500	Cable	AM11SS Encoder Extension Cable, 5M
2108-1000	Cable	AM11SS Encoder Extension Cable, 10M
MF150A24AG-V	Switching Power Supply	150W, 24V
MF320A48AG-V	Switching Power Supply	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W

◇ -P Pulse input type



Ordering Information

150W P/N: MF150A24AG-V
320W P/N: MF320A48AG-V

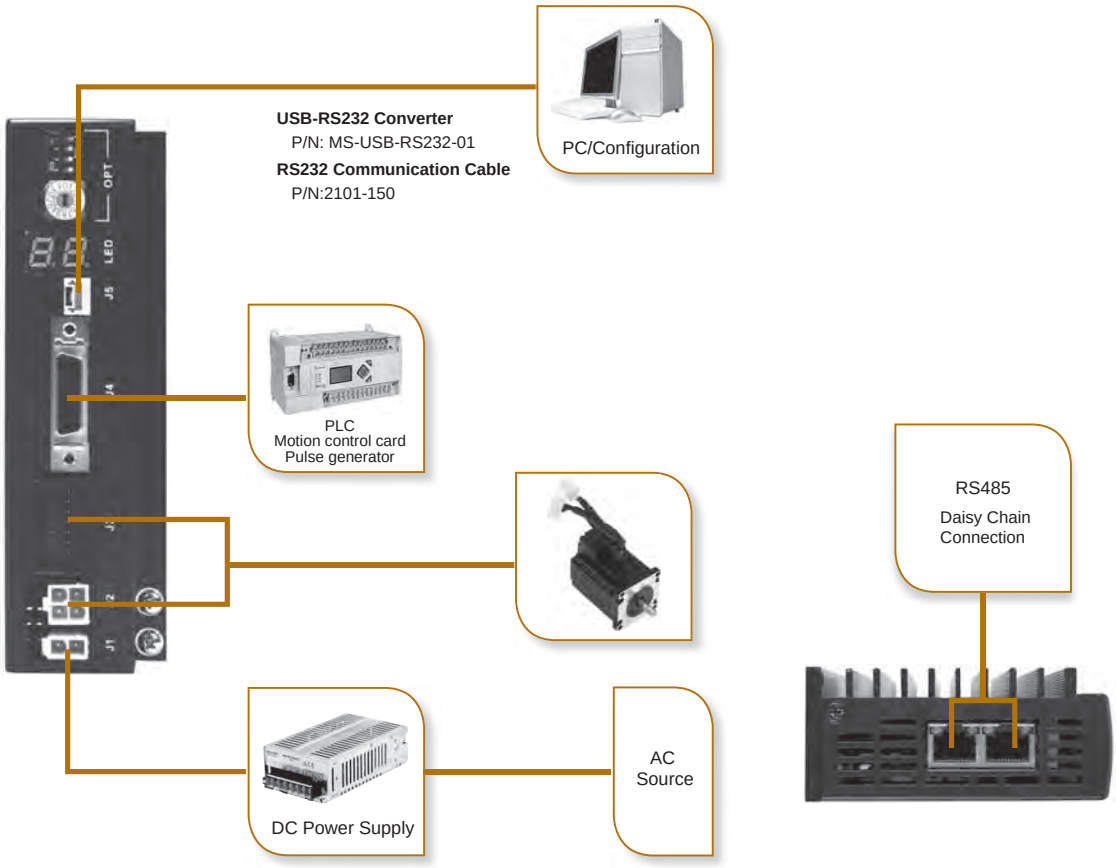
◇ Stand Accessories

P/N	Catagory	Technical Specification
1103-200	Cable	Power Supply Cable, 2M
2101-150	Cable	RS232 Communication Cable, 1.5M

◇ Optional Accessories

P/N	Catagory	Technical Specification
2103-100	Cable	AM17/23/24/34SS Motor Extension Cable, 1M
2103-300	Cable	AM17/23/24/34SS Motor Extension Cable, M
2103-500	Cable	AM17/23/24/34SS Motor Extension Cable, 5M
2103-1000	Cable	AM17/23/24/34SS Motor Extension Cable, 10M
2109-100	Cable	AM11SS Motor Extension Cable, 1M
2109-300	Cable	AM11SS Motor Extension Cable, 3M
2109-500	Cable	AM11SS Motor Extension Cable, 5M
2109-1000	Cable	AM11SS Motor Extension Cable, 10M
2104-100	Cable	AM17/23/24/34SS Encoder Extension Cable, 1M
2104-300	Cable	AM17/23/24/34SS Encoder Extension Cable, 3M
2104-500	Cable	AM17/23/24/34SS Encoder Extension Cable, 5M
2104-1000	Cable	AM17/23/24/34SS Encoder Extension Cable, 10M
2108-100	Cable	AM11SS Encoder Extension Cable, 1M
2108-300	Cable	AM11SS Encoder Extension Cable, 3M
2108-500	Cable	AM11SS Encoder Extension Cable, 5M
2108-1000	Cable	AM11SS Encoder Extension Cable, 10M
MF150A24AG-V	Switching Power Supply	150W, 24V
MF320A48AG-V	Switching Power Supply	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W

◇ -S Basic type with serial communication



Ordering Information

150W P/N: MF150A24AG-V
320W P/N: MF320A48AG-V

◇ Stand Accessories

P/N	Catagory	Technical Specification
1103-200	Cable	Power Supply Cable, 2M
2101-150	Cable	RS232 Communication Cable, 1.5M

◇ Optional Accessories

P/N	Catagory	Technical Specification
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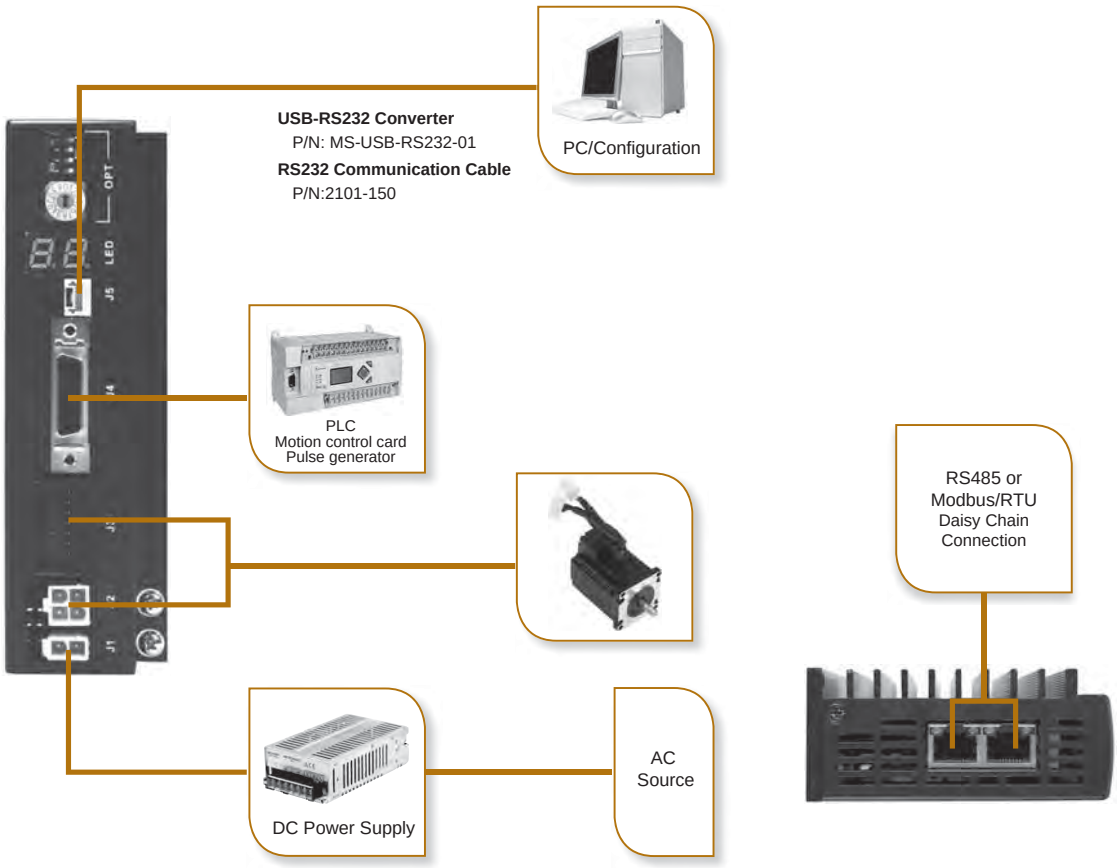
2103-300	Cable	AM17/23/24/34SS Motor Extension Cable, M
2103-500	Cable	AM17/23/24/34SS Motor Extension Cable, 5M
2103-1000	Cable	AM17/23/24/34SS Motor Extension Cable, 10M
2109-100	Cable	AM11SS Motor Extension Cable, 1M
2109-300	Cable	AM11SS Motor Extension Cable, 3M
2109-500	Cable	AM11SS Motor Extension Cable, 5M
2109-1000	Cable	AM11SS Motor Extension Cable, 10M
2104-100	Cable	AM17/23/24/34SS Encoder Extension Cable, 1M
2104-300	Cable	AM17/23/24/34SS Encoder Extension Cable, 3M
2104-500	Cable	AM17/23/24/34SS Encoder Extension Cable, 5M
2104-1000	Cable	AM17/23/24/34SS Encoder Extension Cable, 10M
2108-100	Cable	AM11SS Encoder Extension Cable, 1M
2108-300	Cable	AM11SS Encoder Extension Cable, 3M
2108-500	Cable	AM11SS Encoder Extension Cable, 5M
2108-1000	Cable	AM11SS Encoder Extension Cable, 10M
MF150A24AG-V	Switching Power Supply	150W, 24V
MF320A48AG-V	Switching Power Supply	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W

◇ -Q Built-in programmable motion controller



Ordering Information

150W P/N: MF150A24AG-V
320W P/N: MF320A48AG-V

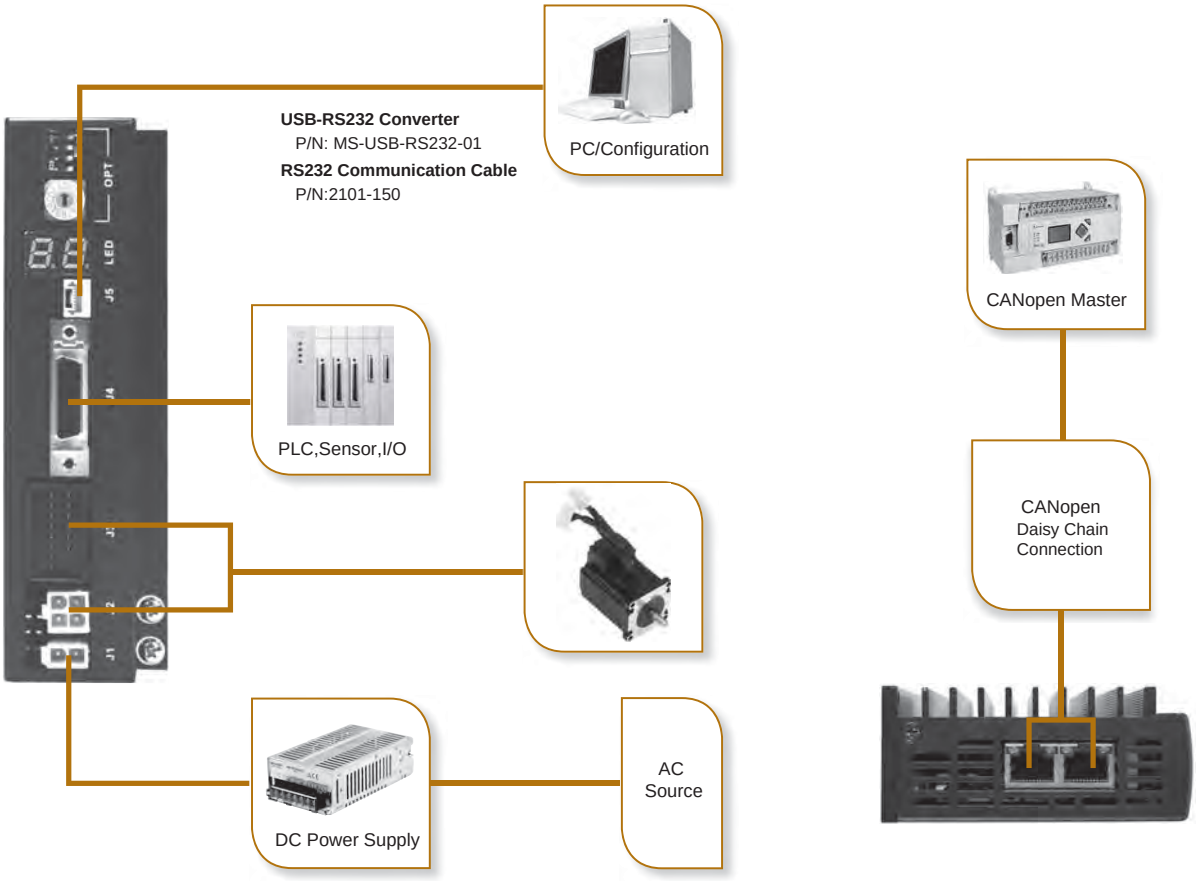
◇ Stand Accessories

P/N	Catagory	Technical Specification
1103-200	Cable	Power Supply Cable, 2M
2101-150	Cable	RS232 Communication Cable, 1.5M

◇ Optional Accessories

P/N	Catagory	Technical Specification
2103-100	Cable	AM17/23/24/34SS Motor Extension Cable, 1M
2103-300	Cable	AM17/23/24/34SS Motor Extension Cable, M
2103-500	Cable	AM17/23/24/34SS Motor Extension Cable, 5M
2103-1000	Cable	AM17/23/24/34SS Motor Extension Cable, 10M
2109-100	Cable	AM11SS Motor Extension Cable, 1M
2109-300	Cable	AM11SS Motor Extension Cable, 3M
2109-500	Cable	AM11SS Motor Extension Cable, 5M
2109-1000	Cable	AM11SS Motor Extension Cable, 10M
2104-100	Cable	AM17/23/24/34SS Encoder Extension Cable, 1M
2104-300	Cable	AM17/23/24/34SS Encoder Extension Cable, 3M
2104-500	Cable	AM17/23/24/34SS Encoder Extension Cable, 5M
2104-1000	Cable	AM17/23/24/34SS Encoder Extension Cable, 10M
2108-100	Cable	AM11SS Encoder Extension Cable, 1M
2108-300	Cable	AM11SS Encoder Extension Cable, 3M
2108-500	Cable	AM11SS Encoder Extension Cable, 5M
2108-1000	Cable	AM11SS Encoder Extension Cable, 10M
MF150A24AG-V	Switching Power Supply	150W, 24V
MF320A48AG-V	Switching Power Supply	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W

◇ -C CANopen type



Ordering Information

150W P/N: MF150A24AG-V
320W P/N: MF320A48AG-V

◇ Stand Accessories

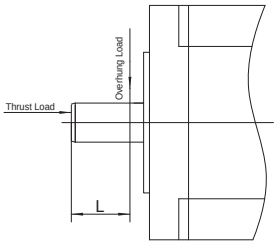
P/N	Catagory	Technical Specification
1103-200	Cable	Power Supply Cable, 2M
2101-150	Cable	RS232 Communication Cable, 1.5M

◇ Optional Accessories

P/N	Catagory	Technical Specification
2103-100	Cable	AM17/23/24/34SS Motor Extension Cable, 1M
2103-300	Cable	AM17/23/24/34SS Motor Extension Cable, M
2103-500	Cable	AM17/23/24/34SS Motor Extension Cable, 5M
2103-1000	Cable	AM17/23/24/34SS Motor Extension Cable, 10M
2109-100	Cable	AM11SS Motor Extension Cable, 1M
2109-300	Cable	AM11SS Motor Extension Cable, 3M
2109-500	Cable	AM11SS Motor Extension Cable, 5M
2109-1000	Cable	AM11SS Motor Extension Cable, 10M
2104-100	Cable	AM17/23/24/34SS Encoder Extension Cable, 1M
2104-300	Cable	AM17/23/24/34SS Encoder Extension Cable, 3M
2104-500	Cable	AM17/23/24/34SS Encoder Extension Cable, 5M
2104-1000	Cable	AM17/23/24/34SS Encoder Extension Cable, 10M
2108-100	Cable	AM11SS Encoder Extension Cable, 1M
2108-300	Cable	AM11SS Encoder Extension Cable, 3M
2108-500	Cable	AM11SS Encoder Extension Cable, 5M
2108-1000	Cable	AM11SS Encoder Extension Cable, 10M
MF150A24AG-V	Switching Power Supply	150W, 24V
MF320A48AG-V	Switching Power Supply	320W, 48V
RC880	Regenaration Clamp	75VDC Max. 50W

Motor Specifications

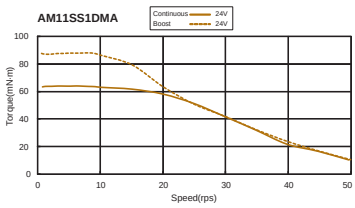
Motor P/N	Drive P/N	Holding Torque	Rotor Inertia	Encoder Resolution	Maximum Speed	Mass	Frame Size	Permissible Overhung Load(N) Distance(L) from Shaft End(mm)					Permissible Thrust Load
		N•m	g•cm²	counts/rev	RPM	g		0	5	10	15	20	
AM11SS1DMA	SS03-■-◇	0.065	9	4096	3600	118	28mm	20	25	34	52	-	Less than the motor mass
AM11SS2DMA		0.08	12			168							
AM11SS3DMA		0.125	18			218							
AM17SS1DG□	SS03-■-◇or SS05-■-◇	0.3	38	20000		390	42mm	35	44	58	85	-	
AM17SS2DG□		0.5	57			440							
AM17SS3DG□		0.6	82			520							
AM17SS4DG□		0.75	123			760							
AM23SS2DG□	SS05-■-◇	0.9	260			850	56mm	63	75	95	130	190	
AM23SS3DG□		1.5	460			1250							
AM24SS3DG□	SS10-■-◇	2.5	900			1650	60mm	90	100	130	180	270	
AM34SS1DGA		3.5	915			2000	80mm	260	290	340	390	480	
AM34SS3DGA		6.0	1480			3100							
AM34SS5DGA		8.0	2200			4200							

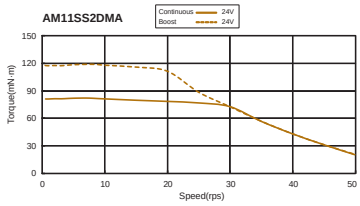


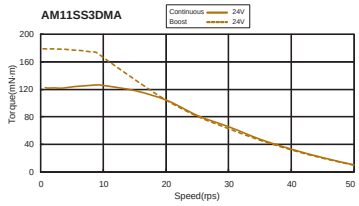
□: A or B, refer to motor part numbering system; ■: R, P, S, Q, or C, refer to driver part numbering system; ◇: A, R or C, refer to driver part numbering system

◇ Torque Curves

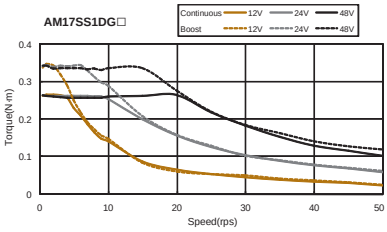
AM11SS Series

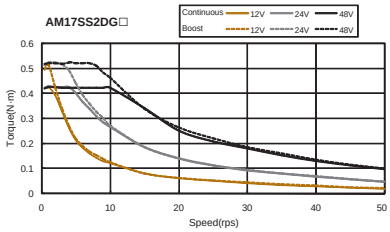


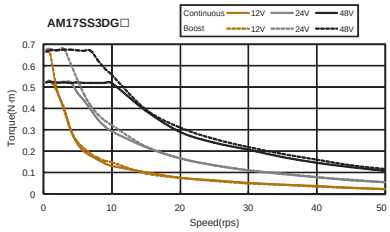


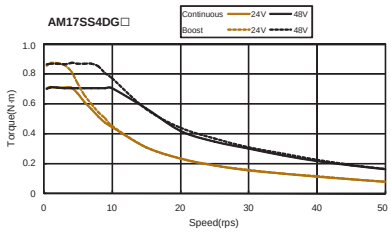


AM17SS Series

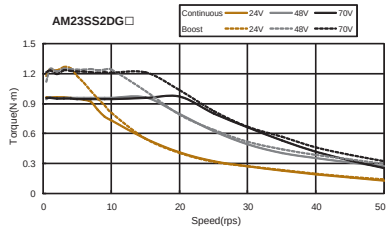


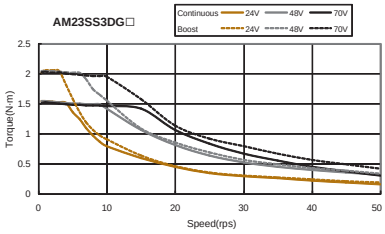




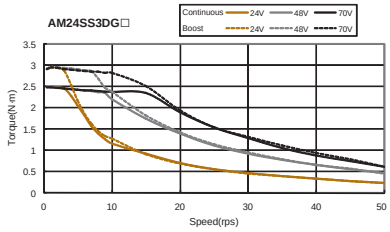


AM23SS Series

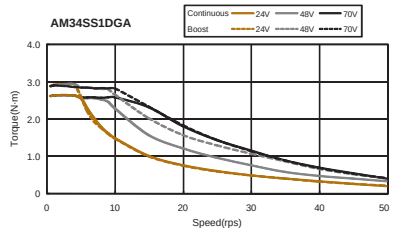


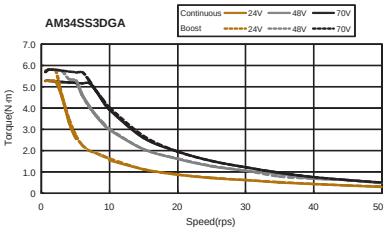


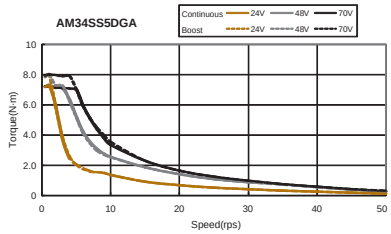
AM24SS Series



AM34SS Series





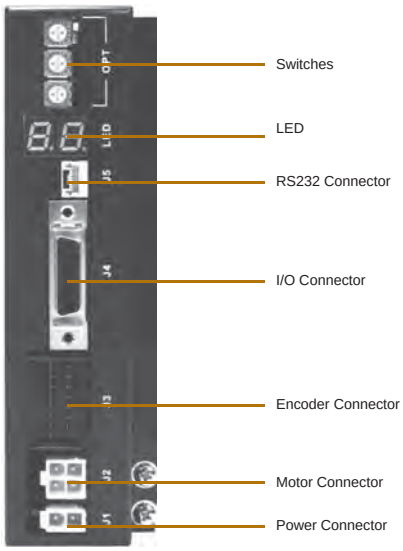


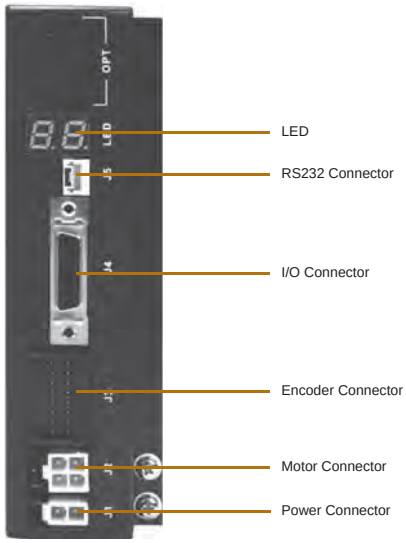
Drive Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Current	SS03: Continuous Current 3A max, Boost Current 4.5A max (1.5s) current limitation auto set-up by attached motor
	SS05: Continuous Current 5A max, Boost Current 7.5A max (1.5s) current limitation auto set-up by attached motor
	SS10: Continuous Current 10A max, Boost Current 15A max (1.5s) current limitation auto set-up by attached motor
Power Supply	External nominal 24 - 70 volt DC power supply required, Absolute maximum input voltage range 18 - 75 VDC
Protection	Over-voltage, under-voltage, over-temp, motor/winding shorts (phase-to-phase, phase-to-ground)
Controller	
Electronic Gearing	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Filters	Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	**R/P type** Position Mode(Pulse & Direction, CW & CCW Pulse, A/B Quadrature) **S type** Position Mode(Pulse & Direction, CW & CCW Pulse, A/B Quadrature); Torque Mode, Velocity Mode, SCL Mode **Q type** Position Mode(Pulse & Direction, CW & CCW Pulse, A/B Quadrature); Torque Mode, Velocity Mode, SCL Mode, Q Programming, Modbus/RTU **C type** CANopen, CiA301, CiA402, Q Programming
Position Table(S type only)	Built-in Position Table, up to 63 positions
Digital Inputs	**R/P type** X1/STEP, X2/DIR, X3/CW Limit, X4/CCW Limit; Optically isolated, differential, 5-24VDC; Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz; X5/Enable, X6/Alarm Reset; Optically isolated, single-ended, 5-24VDC **S/Q/C type** X1/STEP, X2/DIR, X3/CW Limit, X4/CCW Limit; Optically isolated, differential, 5-24VDC; Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz; X5/Enable, X6/Alarm Reset, X7, X8; Optically isolated, single-ended, 5-24VDC
Digital Outputs	**R/P type** Y1/Alarm, Y2/In Position; Optically isolated, 30V/100 mA max **S/Q/C type** Y1/Alarm, Y2/In Position, Y3, Y4; Optically isolated, 30V/100 mA max
Analog Inputs (S/Q/C type only)	Two analog inputs Each input can accept a signal range of 0 to 5 VDC, ±5 VDC, 0 to 10 VDC or ±10 VDC
Encoder Outputs (R/P type only)	Differential encoder outputs (A±, B±, Z±), 26C31 line driver, 20 mA sink or source max
+5V Output	4.8~5V, 100 mA max
Communication	RS-232, RS-485(optional), Modbus/RTU(optional), CANopen(optional)
Physical	
Ambient Temperature	0 to 40°C (32 to 104°F) when mounted to a suitable heatsink
Ambient Humdity	90% Max., non-condensing
Mass	Approx 0.3 Kg

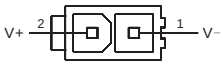
Connection and Operation

(R type and P type)



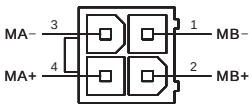


Power Connector



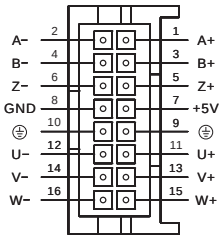
PIN	Description
1	Power Supply -
2	Power Supply +

Motor Connector



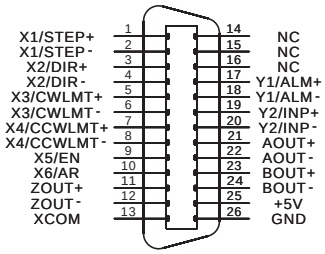
Pin.	Description
1	Motor Phase B-
2	Motor Phase B+
3	Motor Phase A-
4	Motor Phase A+

Encoder Connector



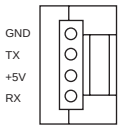
Pin.	Description
1	Encoder A+
2	Encoder A-
3	Encoder B+
4	Encoder B-
5	Encoder Z+
6	Encoder Z-
7	+5V Power Supply for Encoder
8	GND
9	Earth GND
10	Earth GND
11	Encoder U+
12	Encoder U-
13	Encoder V+
14	Encoder V-
15	Encoder W+
16	Encoder W-

I/O Connector



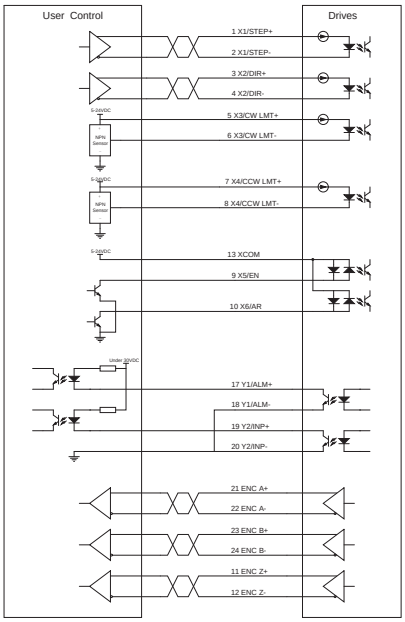
Pin.	Description
1 X1/STEP+	Digital Input 1/Step Input+
2 X1/STEP-	Digital Input 1/Step Input-
3 X2/DIR+	Digital Input 2/Direction Input+
4 X2/DIR-	Digital Input 2/Direction Input-
5 X3/CWLMT+	Digital Input 3/CW Limit Input+
6 X3/CWLMT-	Digital Input 3/CW Limit Input-
7 X4/CCWLMT+	Digital Input 4/CCW Limit Input+
8 X4/CCWLMT-	Digital Input 4/CCW Limit Input-
9 X5/EN	Digital Input 5/Servo On Input
10 X6/AR	Digital Input 6/Alarm Reset Input
11 ZOUT+	Encoder Output Z+
12 ZOUT-	Encoder Output Z-
13 XCOM	Digital Input COM for X5, X6
14 NC	No Connection
15 NC	No Connection
16 NC	No Connection
17 Y1/ALM+	Digital Output 1/Alarm Output+
18 Y1/ALM-	Digital Output 1/Alarm Output-
19 Y2/INP+	Digital Output 2/In Position Output+
20 Y2/INP-	Digital Output 2/In Position Output-
21 AOUT+	Encoder Output A+
22 AOUT-	Encoder Output A-
23 BOUT+	Encoder Output B+
24 BOUT-	Encoder Output B-
25 +5V	+5V Output for user
26 GND	GND

Communication Connector



Pin.	Description
GND	GND
TX	Data transmit
+5V	+5V
RX	Data receive

◇ Wiring Diagram



◇ Description of Input/Output Signals

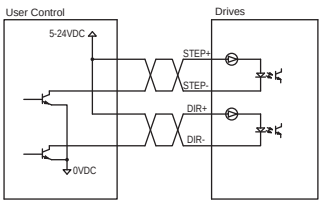
Input (Output) "ON" indicates that the current is flowing into or out of an input or output.

Input (Output) "OFF" indicates that there is no current flowing into or out of an input or output.

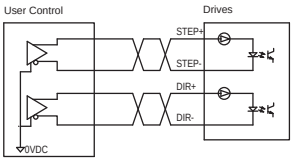
- Circuit above shows when pulse input is line driver type
- Pulse signal input range 5-24VDC
- Digital signal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safety distance between the control I/O signal wires and power wires.

● Pulse Input Circuit and Sample Connection

With Open Collector Output



With Line Driver Output



● Pulse Input Mode

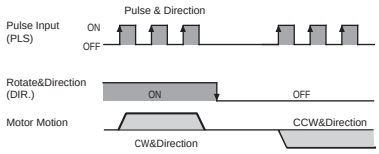
Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction

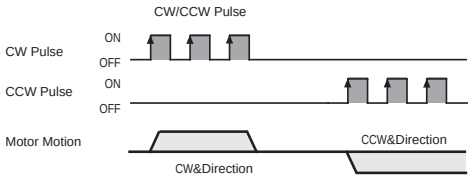


CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in one direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

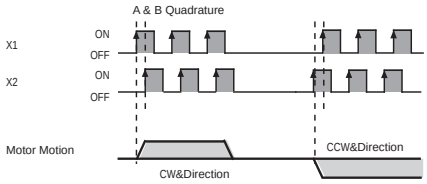
*Direction definition can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction



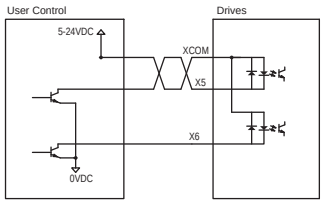
A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder. Direction definition can be configured via **Step-Servo** Quick Tuner. Direction is determined via which channel leads the other. The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.

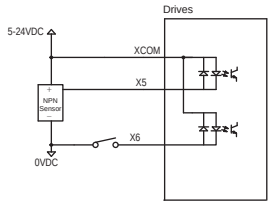


● Digital Input Circuit and Sample Connection

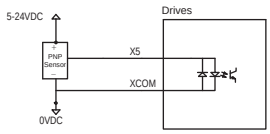
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo On Input

X5 can be configured as Enable signal to excite the motor.

Alarm Reset Input

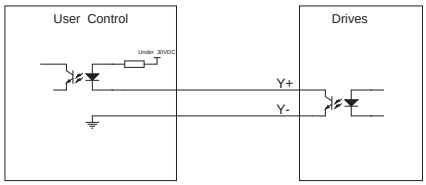
X6 can be configured as Reset signal to clear the alarm.

Caution: Please make sure there's no error in system before you clear an Alarm.

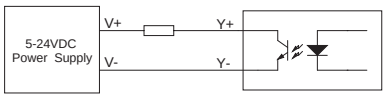
◇ Connecting using Digital Outputs

- Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the LED will display the error code.

In Position Output

Y1 or Y2 can be configured as signal output when position error is less than a user-defined count value.

Timing Output

Y2 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°, 50 pulses output with one rotation.

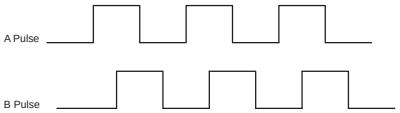
Tach Output

Y2 can be configured as Tach signal output. Tach output produces pulses relative to the motor position with configurable resolution: 100, 200, 400, 800, 1600.

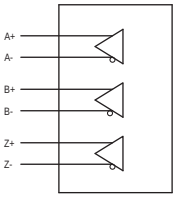
- Encoder Output

- Differential pulse output with channel A/B/Z
- While motor rotates one revolution, A-Phase/B-Phase generate total 20,000 counts, Z-Phase generates one signal.
- The B-Phase output has a 90°phase difference with respect to the A-Phase output. Phase A Leads B 90°while motor rotates by CW direction, phase B leads A 90°while motor rotates by CCW direction.

Pulse Output Signal Chart

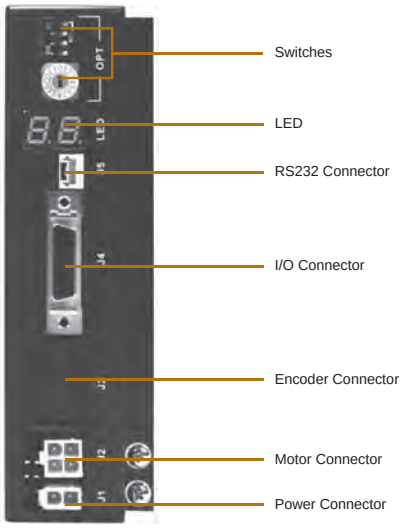


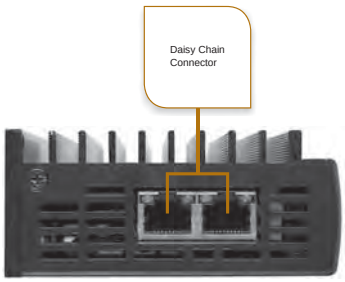
Encoder Output Circuit



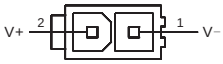
Connection and Operation

(S type, Q type and C type)



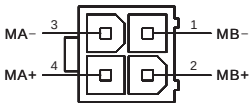


Power Connector



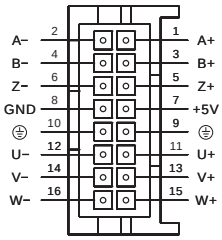
PIN	Description
1	Power Supply -
2	Power Supply +

Motor Connector



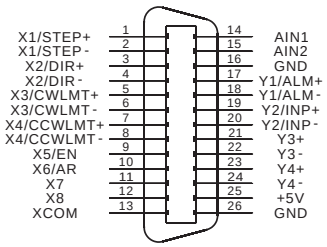
Pin.	Description
1	Motor Phase B-
2	Motor Phase B+
3	Motor Phase A-
4	Motor Phase A+

Encoder Connector



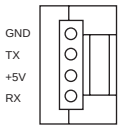
Pin.	Description
1	Encoder A+
2	Encoder A-
3	Encoder B+
4	Encoder B-
5	Encoder Z+
6	Encoder Z-
7	+5V Power Supply for Encoder
8	GND
9	Earth GND
10	Earth GND
11	Encoder U+
12	Encoder U-
13	Encoder V+
14	Encoder V-
15	Encoder W+
16	Encoder W-

I/O Connector



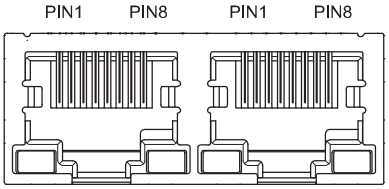
Pin.	Description
1 X1/STEP+	Digital Input 1/Step Input+
2 X1/STEP-	Digital Input 1/Step Input-
3 X2/DIR+	Digital Input 2/Direction Input+
4 X2/DIR-	Digital Input 2/Direction Input-
5 X3/CWLMT+	Digital Input 3/CW Limit Input+
6 X3/CWLMT-	Digital Input 3/CW Limit Input-
7 X4/CCWLMT+	Digital Input 4/CCW Limit Input+
8 X4/CCWLMT-	Digital Input 4/CCW Limit Input-
9 X5/EN	Digital Input 5/Servo On Input
10 X6/AR	Digital Input 6/Alarm Reset Input
11 X7	Digital Input 7
12 X8	Digital Input 8
13 XCOM	Digital Input COM for X5, X6, X7, X8
14 AIN1	Analog Input 1
15 AIN2	Analog Input 2
16 GND	GND
17 Y1/ALM+	Digital Output 1/Alarm Output+
18 Y1/ALM-	Digital Output 1/Alarm Output-
19 Y2/INP+	Digital Output 2/In Position Output+
20 Y2/INP-	Digital Output 2/In Position Output-
21 Y3+	Digital Output 3+
22 Y3-	Digital Output 3-
23 Y4+	Digital Output 4+
24 Y4-	Digital Output 4-
25 +5V	+5V Output for user
26 GND	GND

Communication Connector



Pin.	Description
GND	GND
TX	Data transmit
+5V	+5V
RX	Data receive

RS485 & CANopen daisy chain connector



RS485

Pin.	Description
1	RX+ / Data receive+
2	RX- / Data receive-
3	TX+ / Data transmit+
6	TX- / Data transmit-
4,5,7,8	GND

CANopen

Pin.	Description
1	CAN_H
2	CAN_L
3	GND
6	CHGND
4,5,7,8	No Connection

RS485 address setting

Low 4 bit (0-15) set by rotary switch. Use **Step-Servo** Quick Tuner and select High (Axis 16-31) to set the address to 16-31.

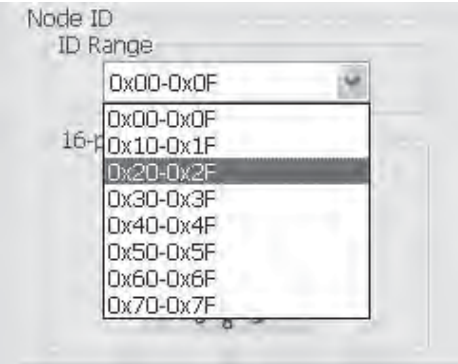
Low or High	Rotary Switch	Address	LED
Low(Axis 0~ 15)	0	0	0
	1	1	1
	2	2	2
	3	3	3
	4	4	4
	5	5	5
	6	6	6
	7	7	7
	8	8	8
	9	9	9
	A	:	A
	B	;	b
	C	<	C
	D	=	d
	E	>	E
	F	?	F
High(Axis 16 ~ 31)	0	@	0.
	1	!	1.
	2	"	2.
	3	#	3.
	4	$	4.
	5	%	5.
	6	&	6.
	7	'	7.
	8	(	8.
	9	)	9.
	A	*	A.
	B	+	b.
	C	,	C.
	D	-	d.
	E	.	E.
	F	/	F.

RS485 baud rate and terminating resistor setting

BAUD RATE			
SW1	SW2	SW3	bps
OFF	OFF	OFF	9600
ON	OFF	OFF	19200
OFF	ON	OFF	38400
ON	ON	OFF	57600
OFF	OFF	OFF	115200
ON	OFF	OFF	Null
OFF	ON	OFF	Null
ON	ON	OFF	Null
TERMINATING RESISTOR			
SW4	OFF ON	Disconnected Connected	

CANopen address setting

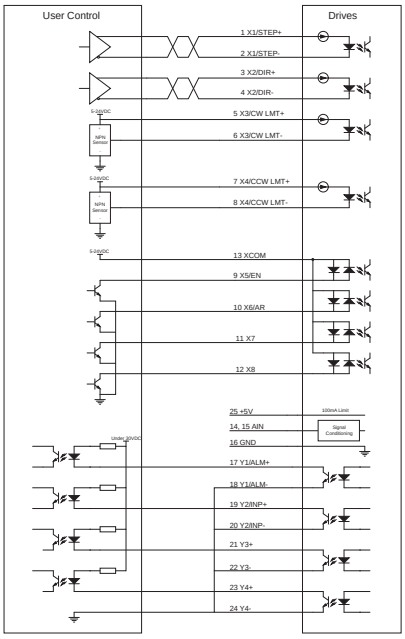
Low 4 bit (0-F) set by rotary switch. Use **Step-Servo** Quick Tuner to set the High 3 bit.



CANopen baud rate and terminating resistor setting

BAUD RATE			
SW1	SW2	SW3	bps
OFF	OFF	OFF	1M
ON	OFF	OFF	800K
OFF	ON	OFF	500K
ON	ON	OFF	250K
OFF	OFF	ON	125K
ON	OFF	ON	50K
OFF	ON	ON	20K
ON	ON	ON	12.5K
TERMINATING RESISTOR			
SW4	OFF ON	Disconnected Connected	

◇ Wiring Diagram



◇ Description of Input/Output Signals

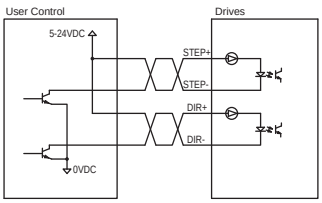
Input (Output) "ON" indicates that the current is flowing into or out of an input or output.

Input (Output) "OFF" indicates that there is no current flowing into or out of an input or output.

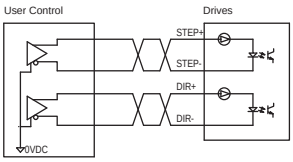
- Circuit above shows when pulse input is line driver type
- Pulse signal input range 5-24VDC
- Digital signal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safety distance between the control I/O signal wires and power wires.

● Pulse Input Circuit and Sample Connection

With Open Collector Output



With Line Driver Output



● Pulse Input Mode

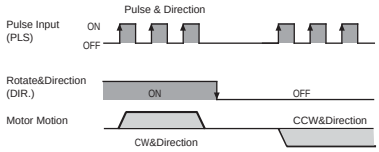
Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction

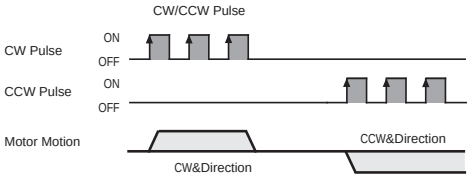


CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in one direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

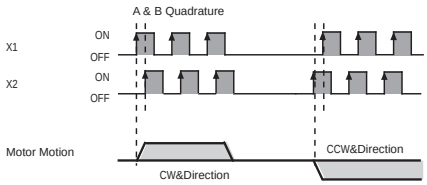
*Direction definition can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction



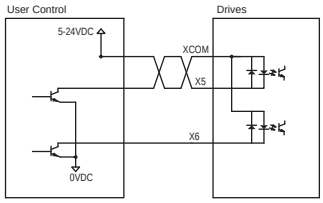
A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder. Direction definition can be configured via **Step-Servo** Quick Tuner. It is determined via which channel leads the other. The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.

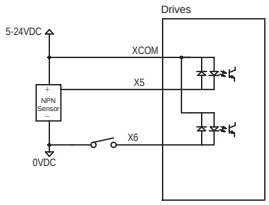


● Digital Input Circuit and Sample Connection

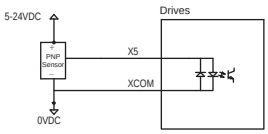
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo On Input

X5 can be configured as Enable signal to excite the motor.

Alarm Reset Input

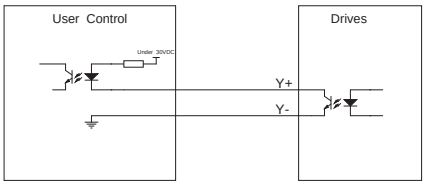
X6 can be configured as Reset signal to clear the alarm.

Caution: Please make sure there's no error in system before you clear an Alarm.

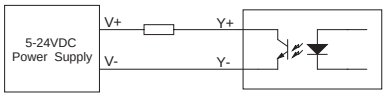
◇ Connecting using Digital Outputs

- Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the LED will display the error code.

In Position Output

Y1, Y2, Y3 or Y4 can be configured as signal output when position error is less than a user-defined count value.

Timing Output

Y2 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°, 50 pulses output with one rotation.

Brake Output

Y3 can be configured as signal output to release brake.

Tach Output

Y2 can be configured as Tach signal output. Tach output produces pulses relative to the motor position with configurable resolution: 100, 200, 400, 800, 1600.

LED Display

SS has two 7-segments LED.

LED1 is used to indicate operation mode and error code. When drive has no error, LED1 is solid on to indicate operation mode. When drive has error, LED1 will flash at a 0.5 second rate to indicate error code. The dot point of LED1 is to indicate whether the drive is enabled. When the dot point is on, the drive is enabled. When the dot point is off, the drive is disabled.

LED1 operation mode display codes (LED is solid on)

1.	1: CM1(Commanded Torque Mode)
2.	2: CM2(Analog Torque Mode)
3.	3: CM11~14(Analog Velocity Mode)
4.	4: CM15~18(Velocity Mode)
5.	5: CM10(Command Torque Mode)
6.	6: CM7(Digital Position Mode)
7.	7: CM21(Point to Point Mode)
8.	8: CM22(Analog Position Mode)
⋮	

LED1 error display codes (LED flashes at a 0.5 second rate)

P	***Position Limit***
L.	CCW Limit
J.	CW Limit
t	***Over Temperature***
H	***Over Voltage***
U.	Under Voltage
b	***Internal Voltage***
C	***Over Current***
c.	Current Foldback
o	***Open Winding***
E	***Bad Encoder***
F.	Flash Memory Error
n.	NV Memory Error
-.	Communication Error
d	Move while Disabled
	Q Program Running

Items in ***bold italic*** represent Drive Faults, which automatically disable the motor.

LED2 is used to indicate bus address and communication baud rate.

After power up, LED2 flashes to indicate the serial communication baud rate for about 6 seconds.

Serial communication baud rate display

LED2	Baud Rate (bps)
1	9600
2	19200
3	38400
4	57600
5	115200

Then LED2 turns to solid on to indicate the low 4 bit bus address (0-F) for RS485 or CANopen drive.

Integrated Stepper Motor

Pulse Input **STM-R**

With Controller **STM**

IP65 With Controller **SWM**

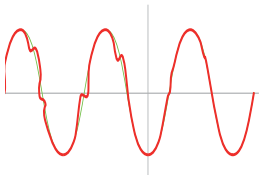
Integrated Stepper Motor

The Integrated Stepper Motor is an integrated Drive+Motor, fusing step motor and drive technologies into a single device, offering savings on space, wiring and cost over conventional motor and drive solutions.

Anti-Resonance

Step motor systems have a natural tendency to resonate at certain speeds. The STM integrated motors automatically calculate the system's natural frequency and apply damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.

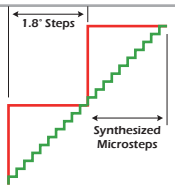
Provides better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low resolution step pulses and create fine resolution motion.

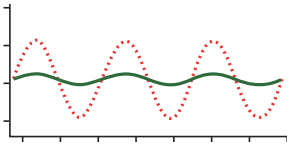
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion profile of the motor. By analyzing this torque ripple the system can apply a negative harmonic to counter this effect. This gives the motor much smoother motion at low speed.

Produces smoother motion at lower speeds



Command Signal Smoothing

Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

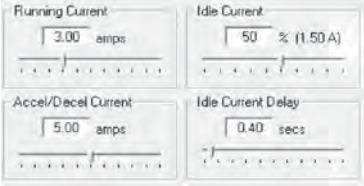
Improves smoother system performance

Dynamic Current Control for STM and SWM

Allows for three current settings to help the motor run cooler and reduce power consumption.

- Running Current - the current the drive will deliver for continuous motion.
- Accel Current - the current the drive will deliver when accelerating or decelerating.
- Idle Current - reduces current draw when motor is stationary.

System runs cooler



Stall Detection & Stall Prevention for STM and SWM

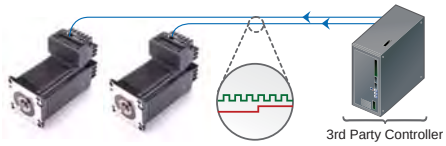
The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Stall Detection notifies the system as soon as the required torque is too great for the motor, resulting in a loss of synchronization between the rotor and stator, also known as stalling. As soon as the motor stalls the drive triggers its fault output.

Stall Prevention automatically adjusts the excitation of the motor windings to maintain synchronization of the rotor and stator under all conditions. This means that motor position is maintained and corrected even when the required torque is too great for the motor. The stall prevention feature also performs position maintenance, which maintains the position of the motor shaft when at rest.

STM-R Control Options

Step & Direction

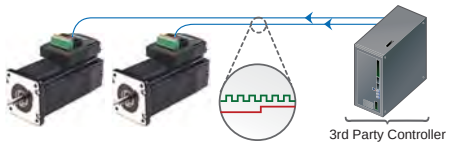


R

- Step & Direction
- CW & CCW pulse

STM&SWM Control Options

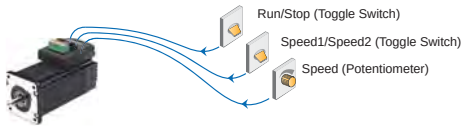
Step & Direction



S

- Step & Direction
- CW & CCW pulse
- A/B quadrature (encoder following)

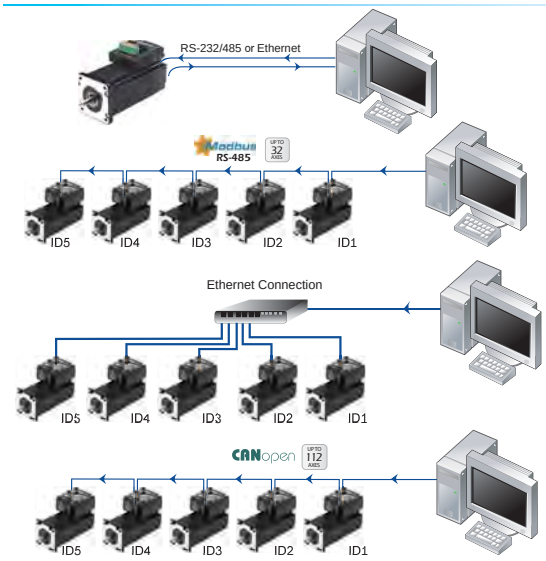
Oscillator / Run-Stop



S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

Host Control



S & **Q**

RS-232

- Accepts commands from host PC or PLC

RS-485

- Accepts commands from host PC or PLC
- Multi-axis capable, up to 32 axes

Q & **IP**

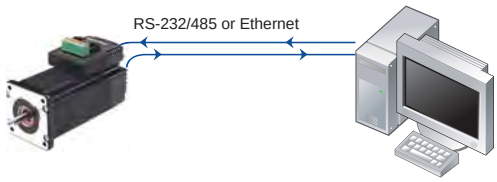
- Accepts commands from host PC or PLC
- 1000's of axes with Ethernet and Ethernet/IP

C

CANopen Model

- Connect to CANopen network
- CiA301 and CiA402 protocols
- Multi axle bus, up to 112 axis

Stand Alone Programmable



Q & **IP**

- Comprehensive text based languaged
- Download, store & execute programs
- High level features: multi-tasking, conditional programming and math functions
- Host interface while executing stored programs

PC Based Software

MOONS' STM and SWM products support following software application make it easy to configure, testing and evaluation.

- ST Configurator
- Q Programmer
- RS485 Bus Utility
- CANopen Test Tool

Overview of Integrated Stepper Motor

STM-R Series - Pluse Input Type Integrated Stepper Motor

Frame Size: 42mm, 56mm
Input Voltage(Typical): 12-48VDC/12-70VDC
Encoder Option: Incremental 4000 counts/rev
Microstep Resolution: Switch set, up to 25600 steps/rev
Control Modes:
- Pulse Control

Inputs and Output:
- 3 Digital Inputs, 1 Digital Output

Position Control

CE RoHS Compliant

STM Series - Controller Type Integrated Stepper Motor

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical):
- STM17 - 12-48VDC
- STM23/24 - 12-70VDC

Encoder: Incremental 40000 counts/rev
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- SF/QF Type- 4 Configurable digital Inputs/Outputs, 1 Analog Input
- S/Q/IP Type- 3 Digital Inputs，1Digital Output，1 Analog Input
- C Type- 3 Digital Inputs, 1 Digital Output

Communication:

Position Control
Velocity Control

CE RoHS Compliant

SCL CANopen eSCL EtherNet/IP Modbus

SWM Series - IP65 Type Integrated Stepper Motor

Frame Size: 60mm
Input Voltage(Typical): 12-70VDC
Encoder: Incremental 4000 counts/rev
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 5 Digital Inputs, 3 Digital Outputs

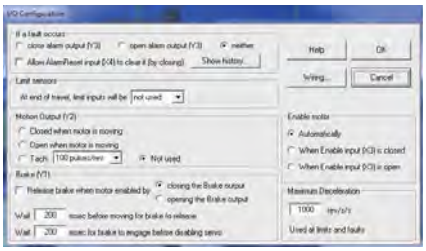
Communication:

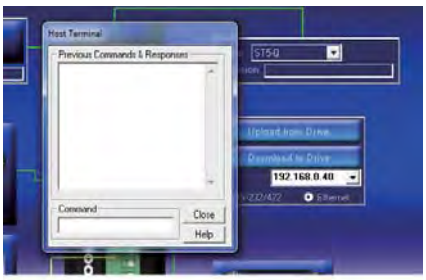
Position Control
Velocity Control

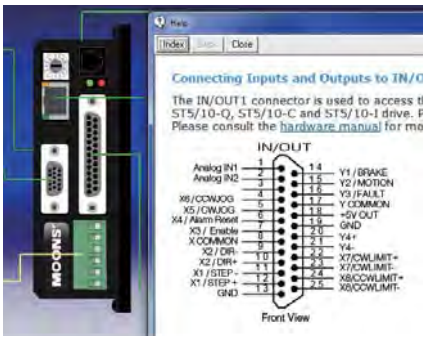
CE RoHS Compliant

SCL CANopen eSCL EtherNet/IP Modbus

ST Configurator







Software Features

- Intuitive interface
- Drive status and alarm monitoring
- Self-test function to test drive/motor operation
- Built-in SCL Terminal
- Online help integrated
- Supports all STM and SWM integrated steppers

About this software

The ST Configurator software makes setting up, configuring and programming STM integrated stepper a snap. All motor, I/O, encoder and motion control parameters are available to the user through an intuitive interface. The ST Configurator provides seamless communication with all models whether they have RS-232, RS-485, CANopen or Ethernet communications. It also includes a built-in Q Programmer so you can switch context quickly and easily.

System Requirements

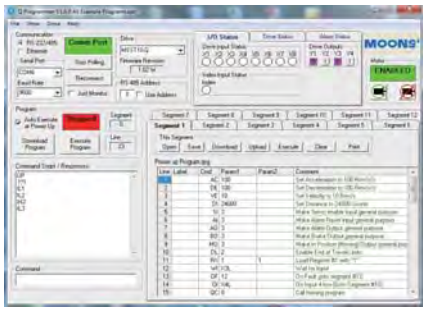
Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

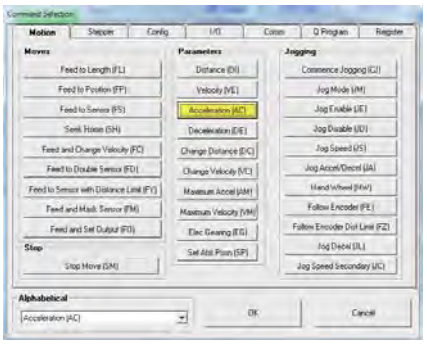
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

Q Programmer

Software





Software Features

- Single-axis motion control
- Stored program execution
- Multi-tasking
- Conditional processing
- Math functions
- Data registers
- Motion Profile simulation
- Online help integrated
- Support all Q/C/IP Types Integrated Motors in STM/SWM Series

About this software

Q Programmer is a single-axis motion control software for programmable stepper and servo drives from MOONS'. The software allows users to create sophisticated and functional programs that Q and Plus drives can run stand-alone. The commands available in the Q programming environment consist of commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

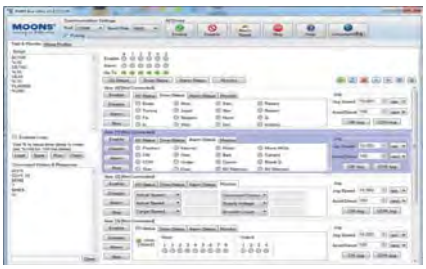
FREE DOWNLOAD

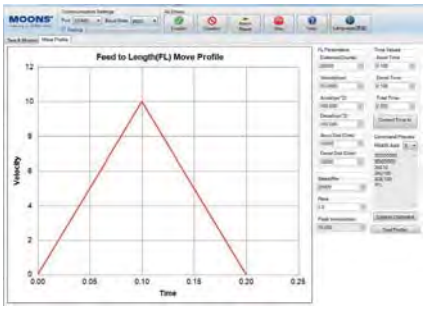
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

RS485 Bus Utility

Software





Software Features

- Stream SCL commands from the command line
- Simple interface with powerful capability
- Easy setup with RS-485 for 32 axis network motion control
- Monitoring Status of I/O, drive, alarm and the other nine most useful motion parameters
- Write and save SCL command scripts
- Online help integrated
- Supports all RS-485 drives

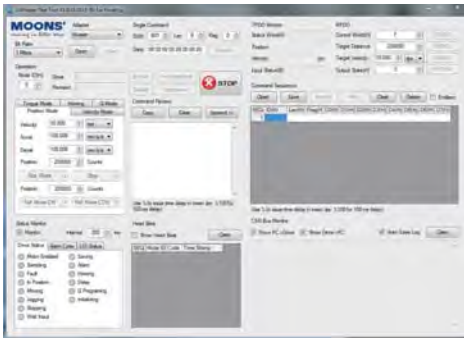
About this software

If you plan to stream serial commands to MOONS' drive using the Serial Command Language (SCL), to build an RS-485 multi-axis network, you'll need a simple terminal emulator to get familiar with and test your command strings and test the network. RS-485 Bus Utility is the ideal choice because it sends command strings as a packet, with minimal delay between characters, and properly terminated with a carriage return. Other terminal applications send each character as it's typed, making them difficult to use with SCL commands.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

CANopen Test Tool



Software Features

- Friendly User Interface
- Multiple operation Mode Support
- Multi-Thread, High Performance
- CAN bus monitor and log function
- Kvaser/PEAK/ZLG adapter support

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

FREE DOWNLOAD

FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

Pluse Input Type Integrated Stepper Motor
STM-R Series

STM-R

The STM-R is an integrated Drive+Motor, fusing step motor and drive technologies into a single device, offering savings on space, wiring and cost over conventional motor and drive solutions.

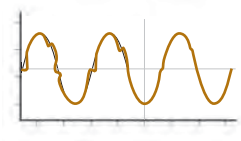
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation

Features

Anti-Resonance/Electronic Damping

Step motor systems have a natural tendency to resonate at certain speeds. The STM-R drive+motor automatically calculates the system's natural frequency and applies damping to the control algorithm. This greatly improves midrange stability, allows for higher speeds, greater torque utilization and also improves settling times.

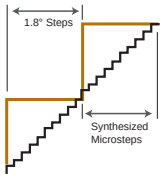
Delivers better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low-resolution step pulses and create fine resolution micro-step motion.

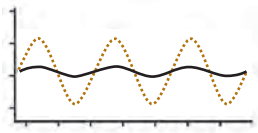
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion of the motor. By analyzing this torque ripple the system can apply a negative harmonic to negate this effect, which gives the motor much smoother motion at low speed.

Delivers smoother motion at lower speeds



Command Signal Smoothing

Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

Improves overall system performance

Self Test & Auto Setup

At start-up the drive measures motor parameters, including the resistance and inductance, then uses this information to optimize the system performance.

STM17R - Pulse Input Type Integrated Stepper Motor

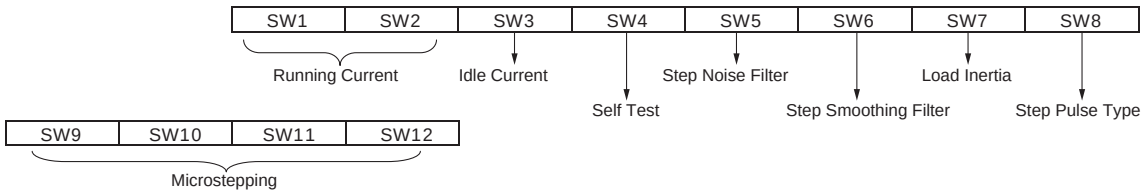
The STM17R Integrated Motor is a cost effective, high performance, motor with the drive built in. It is based on advanced digital current control technology, and features high torque, low noise, and low vibration. Operational parameters are switch selectable.

CE RoHS

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 16 KHz
Power Supply	External 12 - 48 volt power supply required
Input Voltage Range	10 - 52 volts min/max (nominal 12 - 48 volts)
Protection	Over-voltage, over-current, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)
Idle Current Reduction	Switch selectable for reduction to 50% or 90% of running current
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heat sink
Humidity	90% non-condensing
Controller	
Current Control	Advanced digital current control provides excellent high speed torque
Speed Range	Speeds up to 3000 rpm
Auto Setup	Measures motor parameters to configure current control and anti-resonance gain settings
Encoder Feedback	Optional 1000 line external encoder, A/B/Z Differential Output
Step Input STEP+/-	Inputs: optically isolated, 5 - 24 volts, min. pulse width 250 ns., max. pulse frequency 2 MHz; motor executes one step on the falling edge of the STEP input signal
Direction Input DIR+/-	Inputs: optically isolated, 5 - 24 volts, min. pulse width 62.5 µs, max. pulse frequency 2 MHz; direction of rotation is controlled by the DIR input state
Enable Input EN+/-	Inputs: optically isolated, 5 - 24 volts, min. pulse width 100 us., max. pulse frequency 10 KHz; enables or disables the drive amplifier
Output OUT+/-	Open Collector, 30 volts, 100 mA max, max. pulse frequency 10 KHz; closes when the drive encounters an error, open when the drive is operating normally

Switch Selections



Running current - output current is set by SW1 & SW2 with a total of 4 settings: 50%, 70%, 90% and 100% of the running current.
Idle Current - can be set by SW3 for 50% of running value to reduce motor and drive heating, or for 90% when a high holding torque is required.
Self test - set by SW4 to check the physical operation of the motor.
Input Noise Filter - set by SW5 this filters out unwanted electrical noise. The frequency of the filter can be set to 150KHz or 2MHz.
Step Smoothing Filter - also called microstep emulation, smooth motion can be obtained from coarse command signals by setting SW6 to ON.
Anti-Resonance/Electronic Damping - setting SW7 for the proper inertia load, low (OFF) or high (ON), can greatly improve the motor's performance.
Step Pulse Type - SW8 allows the motor to be used with either CW/CCW pulse type command signals (ON), or STEP/DIR pulse type signals (OFF).
Microstep resolution - SW9, SW10, SW11, and SW12 set the microstep resolution at one of 16 settings: 200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000, 10000, 20000, or 25000 steps/rev.

Mass	STM17R-1□: 280 g STM17R-2□: 360 g STM17R-3□: 440 g
Rotor Inertia	STM17R-1□: 38 g•cm^2 STM17R-2□: 57 g•cm^2 STM17R-3□: 82 g•cm^2

Encoder Option

STM-R models can be ordered with an optional 1000 line incremental encoder mounted to the rear shaft of the unit. This encoder can be connected to the external controller for position verification and enhanced performance, depending on the features of the controller.

Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

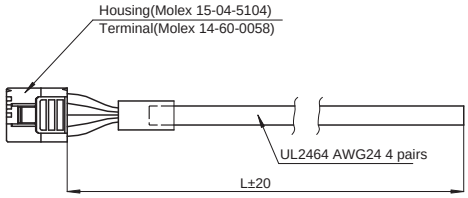
Mating Connectors

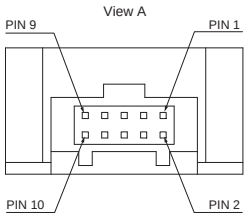
Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700

Accessories

Encoder cable packed together with motor

P/N	Length
1001-100	2m
1009-500	5m

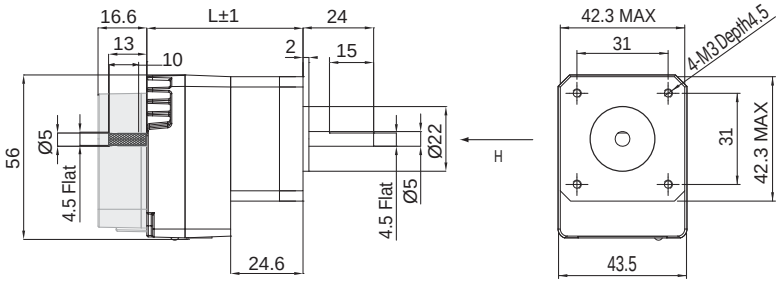


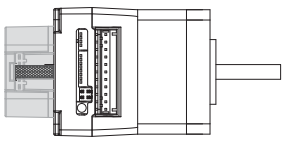


Pin.	Sign	Color
1	NC	
2	Ground	Green White
3	I-	Orange White
4	I+	Orange
5	A-	Blue White
6	A+	Blue
7	+5V DC	Green
8	NC	
9	B-	Brown White
10	B+	Brown

Dimensions(Unit:mm)

Visit www.moonsindustries.com to get the 3D drawing.

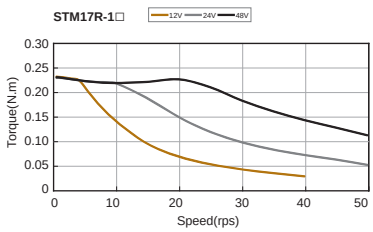


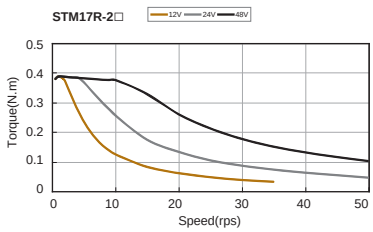


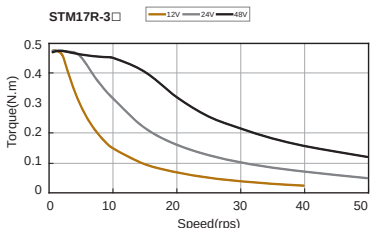
Model	"L" Length
STM17R-1□	53
STM17R-2□	59
STM17R-3□	67

Rear Shaft
external encoder

Torque Curves







Numbering System

STM 17 R-2 E

- STM Series
- Fram Size17
- R=Pulse Input Type
- Torque
  1=0.23N·m max
  2=0.38N·m max
  3=0.48N·m max
- Option
  Blank=Standard
  D=Double Shaft
  E=External Encoder

Ordering Information

Model	Standard	Double shaft	External Encoder
STM17R-1	✓		
STM17R-1D		✓	
STM17R-1E			✓
STM17R-2	✓		
STM17R-2D		✓	
STM17R-2E			✓
STM17R-3	✓		
STM17R-3D		✓	
STM17R-3E			✓

STM23R - Pulse Input Type Integrated Stepper Motor

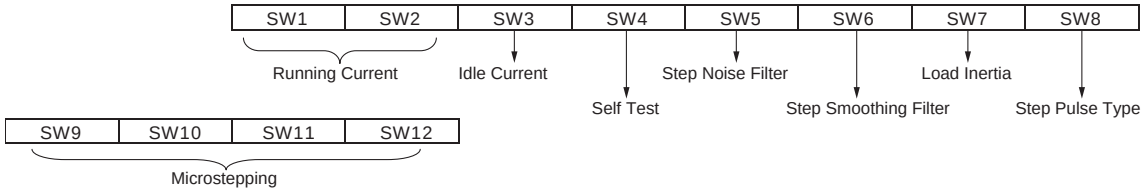
The STM23R Integrated Motor is a cost effective, high performance, motor with the drive built in. It is based on advanced digital current control technology, and features high torque, low noise, and low vibration. Operational parameters are switch selectable.

CE RoHS

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 16 KHz
Power Supply	External 12 - 70 volt power supply required
Input Voltage Range	10 - 75 volts min/max (nominal 12 - 70 volts)
Protection	Over-voltage, over-current, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)
Idle Current Reduction	Switch selectable for reduction to 50% or 90% of running current
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heat sink
Humidity	90% non-condensing
Controller	
Current Control	Advanced digital current control provides excellent high speed torque
Speed Range	Speeds up to 3000 rpm
Auto Setup	Measures motor parameters to configure current control and anti-resonance gain settings
Encoder Feedback	Optional 1000 line external encoder, A/B/Z Differential Output
Step Input STEP+/-	Inputs: optically isolated, 5 - 24 volts, min. pulse width 250 ns., max. pulse frequency 2 MHz; motor executes one step on the falling edge of the STEP input signal
Direction Input DIR+/-	Inputs: optically isolated, 5 - 24 volts, min. pulse width 62.5 µs, max. pulse frequency 2 MHz; direction of rotation is controlled by the DIR input state
Enable Input EN+/-	Inputs: optically isolated, 5 - 24 volts, min. pulse width 100 us., max. pulse frequency 10 KHz; enables or disables the drive amplifier
Output OUT+/-	Open Collector, 30 volts, 100 mA max, max. pulse frequency 10 KHz; closes when the drive encounters an error, open when the drive is operating normally

Switch Selections



Running current - output current is set by SW1 & SW2 with a total of 4 settings: 50%, 70%, 90% and 100% of the running current.

Idle Current - can be set by SW3 for 50% of running value to reduce motor and drive heating, or for 90% when a high holding torque is required.

Self test - set by SW4 to check the physical operation of the motor.

Input Noise Filter - set by SW5 this filters out unwanted electrical noise. The frequency of the filter can be set to 150KHz or 2MHz.

Step Smoothing Filter - also called microstep emulation, smooth motion can be obtained from coarse command signals by setting SW6 to ON.

Anti-Resonance/Electronic Damping - setting SW7 for the proper inertia load, low (OFF) or high (ON), can greatly improve the motor's performance.

Step Pulse Type - SW8 allows the motor to be used with either CW/CCW pulse type command signals (ON), or STEP/DIR pulse type signals (OFF).

Microstep resolution - SW9, SW10, SW11, and SW12 set the microstep resolution at one of 16 settings: 200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000, 10000, 20000, or 25000 steps/rev.

Mass	STM23R-2□: 850 g STM23R-3□: 1200 g
Rotor Inertia	STM23R-2□: 260 g•cm^2 STM23R-3□: 460 g•cm^2

Encoder Option

STM-R models can be ordered with an optional 1000 line incremental encoder mounted to the rear shaft of the unit. This encoder can be connected to the external controller for position verification and enhanced performance, depending on the features of the controller.

Electrical Specification

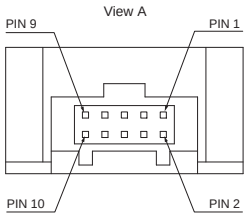
Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

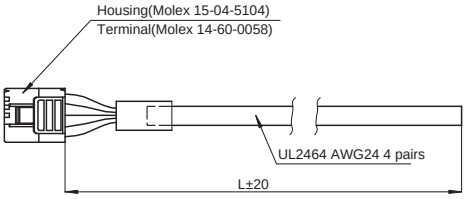
Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700
Encoder cable packed together with motor

P/N	Length
1001-100	2m
1009-500	5m

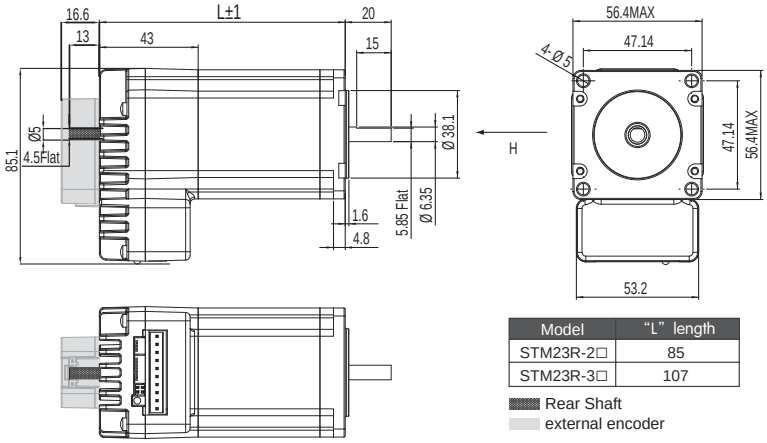


Pin.	Sign	Color
1	NC	
2	Ground	Green White
3	I-	Orange White
4	I+	Orange
5	A-	Blue White
6	A+	Blue
7	+5V DC	Green
8	NC	
9	B-	Brown White
10	B+	Brown



Dimensions(Unit:mm)

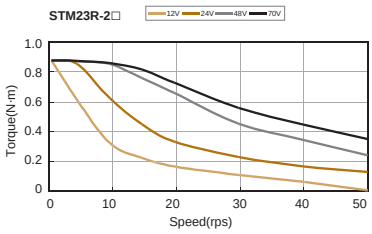
Visit www.moonsindustries.com to get the 3D drawing.

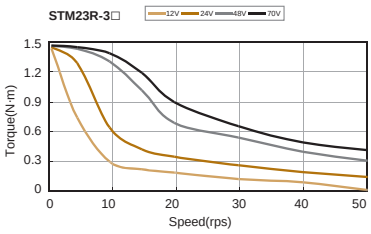


Model	"L" length
STM23R-2□	85
STM23R-3□	107

Rear Shaft
external encoder

Torque Curves





Numbering System

STM 23 R-2 E

STM Series

Frame Size23

R-Pulse Input Type

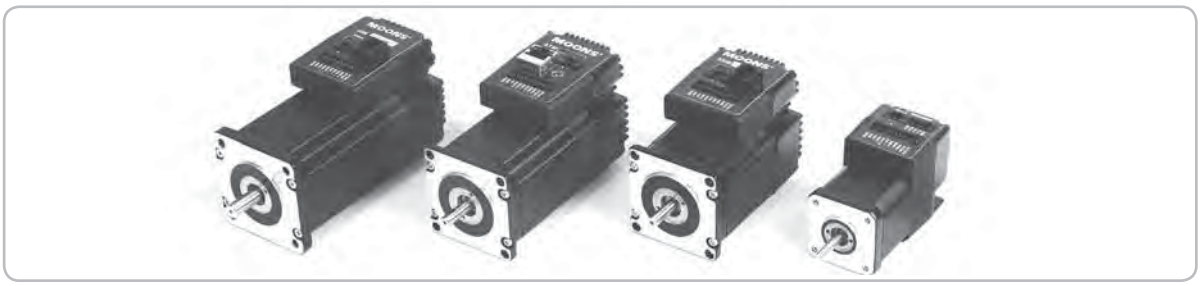
Torque
2=0.9N·m max
3=1.5N·m max

Option
Blank=Standard
D=Double Shaft
E=External Encoder

Ordering Information

Model	Standard	Double shaft	External Encoder
STM23R-2	✓		
STM23R-2D		✓	
STM23R-2E			✓
STM23R-3	✓		
STM23R-3D		✓	
STM23R-3E			✓

Controller Type Integrated Stepper Motor - STM Series



Drive + **Motor** + **Controller**

The STM is an integrated Drive+Motor+Controller, fusing step motor and drive technologies into a single device, offering savings on space, wiring and cost over conventional motor and drive solutions.

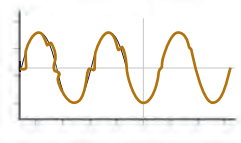
- ✓ Dynamic Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation
- ✓ Stall Detection and Stall Prevention

Features

Anti-Resonance

Step motor systems have a natural tendency to resonate at certain speeds. The STM integrated motors automatically calculate the system's natural frequency and apply damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.

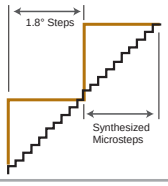
Provides better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low resolution step pulses and create fine resolution motion.

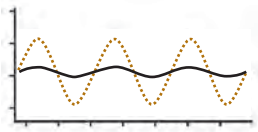
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion profile of the motor. By analyzing this torque ripple the system can apply a negative harmonic to counter this effect. This gives the motor much smoother motion at low speed.

Produces smoother motion at lower speeds



Command Signal Smoothing

Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

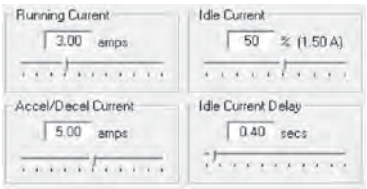
Improves smoother system performance

Dynamic Current Control

Allows for three current settings to help the motor run cooler and reduce power consumption.

- Running Current - the current the drive will deliver for continuous motion.
- Accel Current - the current the drive will deliver when accelerating or decelerating.
- Idle Current - reduces current draw when motor is stationary.

System runs cooler

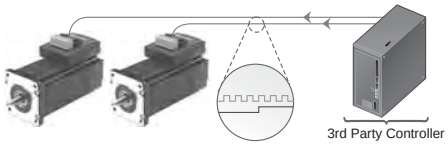


Stall Detection & Stall Prevention

The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Control Options

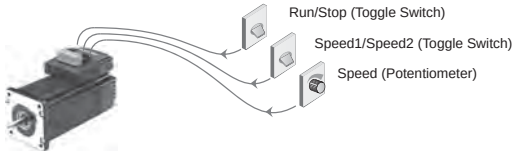
Step & Direction



S

- Step & Direction
- CW & CCW pulse
- A/B quadrature (encoder following)

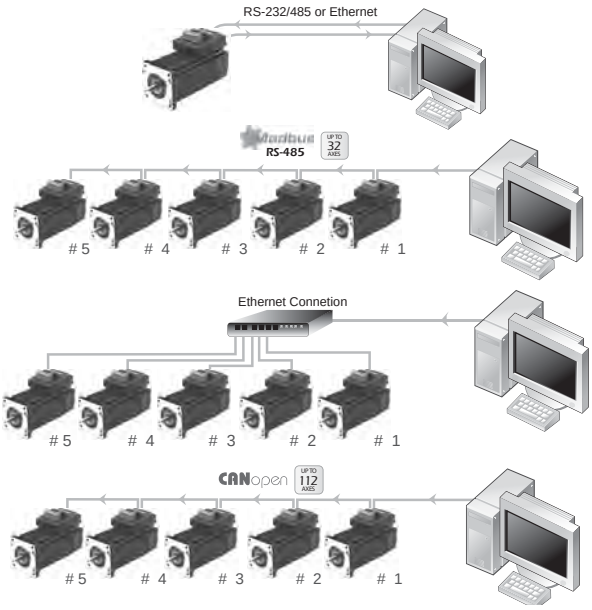
Oscillator / Run-Stop



S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

Host Control



S & Q

RS-232

- Accepts commands from host PC or PLC

RS-485 or Modbus/RTU network

- Accepts commands from host PC or PLC
- Multi-axis capable, up to 32 axes

Q & IP

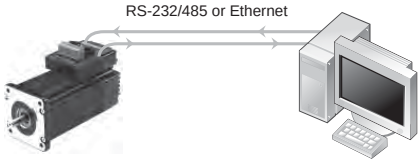
- Accepts commands from host PC or PLC
- 1000's of axes with Ethernet and Ethernet/IP

C

CANopen Model

- Connect to CANopen network
- CiA301 and CiA402 protocols
- Multi axle bus, up to 112 axis

Stand Alone Programmable



Q & IP

- Comprehensive text based languaged
- Download, store & execute programs
- High level features: multi-tasking, conditional programming and math functions
- Host interface while executing stored programs

STM17 - Controller Type Integrated Stepper Motor

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	STM17□-1□□: Up to 0.23N•m STM17□-2□□: Up to 0.38N•m STM17□-3□□: Up to 0.48N•m
Power Supply	External 12 - 48 volt power supply required
Protection	Over-voltage, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)

CE RoHS

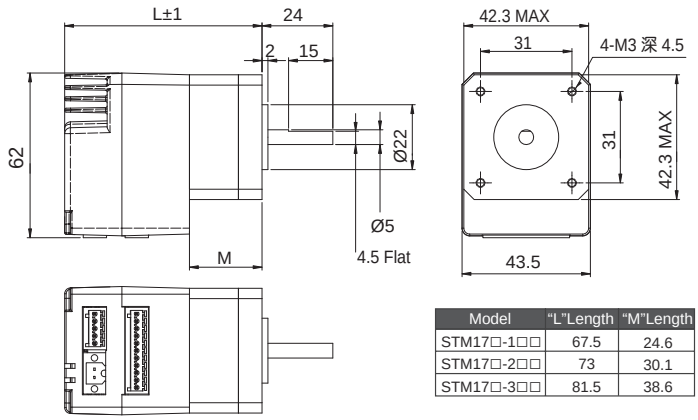
Controller	
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Feedback	Optional 4000 counts/rev encoder feedback
Speed Range	Speeds up to 3000 rpm
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	STM17S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) STM17Q: All STM17S modes of operation plus stored Q program execution STM17C: CANopen slave node plus stored Q Program execution
Digital Input	**S/Q type:** Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** optically isolated, 5-24 volts, minimum pulse width 250 ns., maximum pulse frequency 2 MHz Function: Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), or general purpose input **DIR+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), or general purpose input **EN+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), or general purpose input **C type:** Adjustable bandwidth digital noise rejection filter on all inputs **IN1+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CW limit, CW jog, or general purpose input **IN2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CCW limit, CCW jog, or general purpose input **IN3+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: general purpose input
Digital Output	**OUT+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits.
Communication	S type: RS-232, RS-485 Q type: RS-232, RS-485 or Modbus/RTU C type: CANOpen, RS-232
Physical	
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heat sink
Humidity	90% non-condensing
Mass	STM17□-1□□: 280 g STM17□-2□□: 360 g STM17□-3□□: 440 g
Rotor Inertia	STM17□-1□□: 38 g•cm^2 STM17□-2□□: 57 g•cm^2 STM17□-3□□: 82 g•cm^2

Connector Pin-out

	RS232	RS485 Modbus	CANopen
Communications Port	RXD +5V TXD GND GND	GND TX- TX+ RX- RX+	GND CAN_L CAN_H RXD TXD
I/O Port	STEP+ STEP - DIR+ DIR - EN+ EN - OUT+ OUT - +5V AIN GND	STEP+ STEP - DIR+ DIR - EN+ EN - OUT+ OUT - +5V AIN GND	IN1+ IN1 - IN2+ IN2 - IN3+ IN3 - OUT+ OUT - +5V AIN GND

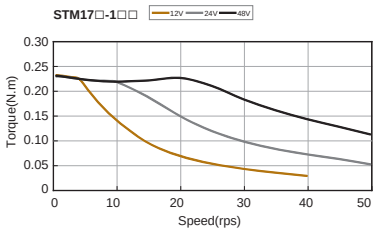
Dimensions(Unit:mm)

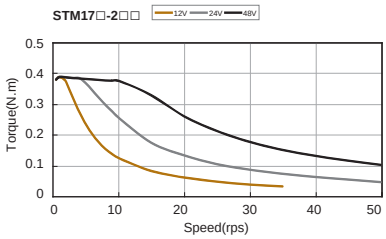
Visit www.moonsindustries.com to get the 3D drawing.

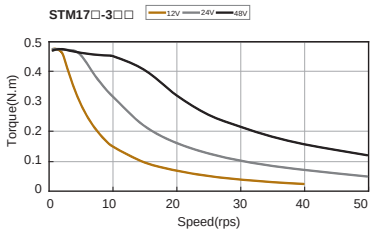


Model	"L"Length	"M"Length
STM17□-1□□	67.5	24.6
STM17□-2□□	73	30.1
STM17□-3□□	81.5	38.6

Torque Curves







Numbering System

STM 17 S-2 A N

- STM Series
- Frame Size17
- Control
  - S=Basic Type
  - Q=Q Programmer Typ (Modbus/RTU Type)
  - C=CANopen Type
- Motor Size
  - 1=0.23 N·m max
  - 2=0.38 N·m max
  - 3=0.48 N·m max
- Communication
  - A=RS-232
  - R=RS-485
  - C=CANopen
- Feedback
  - N=None
  - E=1000-line encoder

Ordering Information

Model	Control	Output Torque	Encoder	RS-232	RS-485	Modbus/RTU	CANopen
STM17S-1AN	S	0.23N·m		✓			
STM17S-1RN					✓		
STM17S-1AE			✓	✓			
STM17S-1RE			✓		✓		
STM17S-2AN		0.38N·m		✓			
STM17S-2RN					✓		
STM17S-2AE			✓	✓			
STM17S-2RE			✓		✓		
STM17S-3AN		0.48N·m		✓			
STM17S-3RN					✓		
STM17S-3AE			✓	✓			
STM17S-3RE			✓		✓		
STM17Q-1AN	Q	0.23N·m		✓			
STM17Q-1RN					✓	✓	
STM17Q-1AE			✓	✓			
STM17Q-1RE			✓		✓	✓	
STM17Q-2AN		0.38N·m		✓			
STM17Q-2RN					✓	✓	
STM17Q-2AE			✓	✓			
STM17Q-2RE			✓		✓	✓	
STM17Q-3AN		0.48N·m		✓			
STM17Q-3RN					✓	✓	
STM17Q-3AE			✓	✓			
STM17Q-3RE			✓		✓	✓	
STM17C-1CN	C	0.23N·m		✓			✓
STM17C-1CE			✓	✓			✓
STM17C-2CN		0.38N·m		✓			✓
STM17C-2CE			✓	✓			✓
STM17C-3CN		0.48N·m		✓			✓
STM17C-3CE			✓	✓			✓

STM23 - Controller Type Integrated Stepper Motor

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	STM23□-2□□: Up to 1.0N•m STM23□-3□□: Up to 1.5N•m
Power Supply	External 12 - 70 volt power supply required
Protection	Over-voltage, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)

CE RoHS

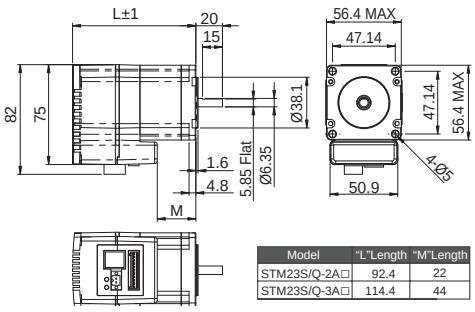
Controller	
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Feedback	Optional 4000 counts/rev encoder feedback
Speed Range	Speeds up to 3000 rpm
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	STM23S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands (SCL) STM23Q: All STM23S modes of operation plus stored Q program execution STM23C: CANopen slave node plus stored Q program execution STM23IP: All STM23Q modes of operation plus EtherNet/IP industrial network communications
Digital Input	**S/Q/IP type:** Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** optically isolated, 5-24 volts, minimum pulse width 250 ns., maximum pulse frequency 2 MHz Function: Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), or general purpose input **DIR+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), or general purpose input **EN+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), or general purpose input **C type:** Adjustable bandwidth digital noise rejection filter on all inputs **IN1+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CW limit, CW jog, or general purpose input **IN2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CCW limit, CCW jog, or general purpose input **IN3+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: general purpose input
Digital Output	**OUT+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits.(Not present on STM23C).
Communication	S type: RS-232, RS-485 or Ethernet Q type: RS-232, RS-485, Ethernet or Modbus/RTU C type: CANOpen, RS-232 IP type: EtherNet/IP
Physical	
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heat sink
Humidity	90% non-condensing
Mass	STM23□-2□□: 850 g STM23□-3□□: 1200 g
Rotor Inertia	STM23□-2□□: 260 g•cm^2 STM23□-3□□: 460 g•cm^2

Connector Pin-out

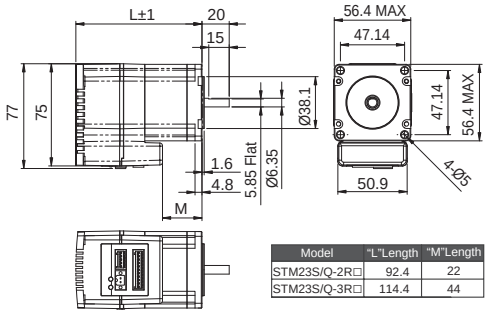
	RS232	RS485 Modbus	CANopen	Ethernet
Communications Port	GND, TX, RX RJ11	GND TX- TX+ RX- RX+	GND RX TX GND CANL CANH	RJ45
I/O Port	STEP+ STEP - DIR+ DIR - EN+ EN - OUT+ OUT - +5V AIN GND	STEP+ STEP - DIR+ DIR - EN+ EN - OUT+ OUT - +5V AIN GND	IN1+ IN1 - IN2+ IN2 - IN3+ IN3 - OUT+ OUT -	STEP+ STEP - DIR+ DIR - EN+ EN - OUT+ OUT - +5V AIN GND

Dimensions(Unit:mm)

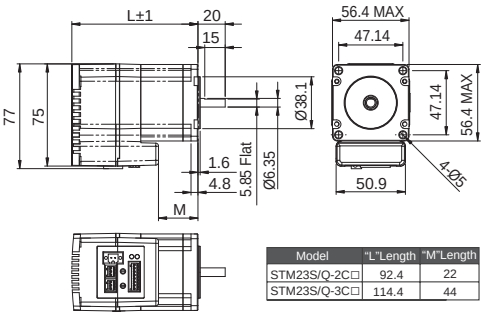
Visit www.moonsindustries.com to get the 3D drawing.



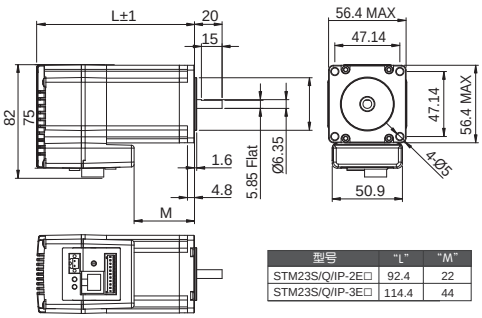
Model	"L"Length	"M"Length
STM23S/Q-2A□	92.4	22
STM23S/Q-3A□	114.4	44



Model	"L"Length	"M"Length
STM23S/Q-2R□	92.4	22
STM23S/Q-3R□	114.4	44

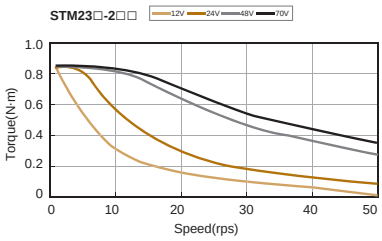


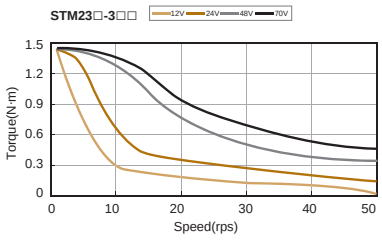
Model	"L"Length	"M"Length
STM23S/Q-2C□	92.4	22
STM23S/Q-3C□	114.4	44



型号	"L"	"M"
STM23S/Q/IP-2E□	92.4	22
STM23S/Q/IP-3E□	114.4	44

Torque Curves





Numbering System

STM 23 S-2 A N

- STM Series
- Frame Size 23
- Control
  S=Basic Type
  Q=Q Programmer Type (Modbus/RTU)
  C=CANopen Type
  IP=Ethernet/IP
- Motor Size
  2=0.9 N·m max
  3=1.5 N·m max
- Communication
  A=RS-232
  R=RS-485
  C=CANopen
  E=Ethernet
- Feedback
  N=None
  E=1000-line encoder

Ordering Information

Model	Control	Output Torque	Encoder	RS-232	RS-485	Modbus/RTU	CANopen	Ethernet	EtherNet/IP
STM23S-2AN	S	0.9N·m		✓					
STM23S-2RN					✓				
STM23S-2EN								✓	
STM23S-2AE			✓	✓					
STM23S-2RE			✓		✓				
STM23S-2EE			✓					✓	
STM23S-3AN		1.5N·m		✓					
STM23S-3RN					✓				
STM23S-3EN								✓	
STM23S-3AE			✓	✓					
STM23S-3RE			✓		✓				
STM23S-3EE			✓					✓	
STM23Q-2AN	Q	0.9N·m		✓					
STM23Q-2RN					✓	✓			
STM23Q-2EN								✓	
STM23Q-2AE			✓	✓					
STM23Q-2RE			✓		✓	✓			
STM23Q-2EE			✓					✓	
STM23Q-3AN		1.5N·m		✓					
STM23Q-3RN					✓	✓			
STM23Q-3EN								✓	
STM23Q-3AE			✓	✓					
STM23Q-3RE			✓		✓	✓			
STM23Q-3EE			✓					✓	
STM23C-2CN	C	0.9N·m		✓			✓		
STM23C-2CE			✓	✓			✓		
STM23C-3CN		1.5N·m		✓			✓		
STM23C-3CE			✓	✓			✓		
STM23IP-2EN	IP	0.9N·m							✓
STM23IP-2EE			✓						✓
STM23IP-3EN		1.5N·m							✓
STM23IP-3EE			✓						✓

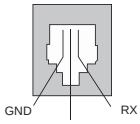
STM24 - Controller Type Integrated Stepper Motor

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	STM24□-3□□: Up to 2.4N•m
Power Supply	External 12 - 70 volt power supply required
Protection	Over-voltage, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)

Controller	
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Feedback	Optional 4000 counts/rev encoder feedback
Speed Range	Speeds up to 3000 rpm
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	STM24S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) STM24Q: All STM24S modes of operation plus stored Q program execution STM24C: CANopen slave node plus stored Q Program execution STM24IP: All STM24Q modes of operation plus EtherNet/IP industrial network communications
Flex I/O RS-232 and RS-485 models	Adjustable bandwidth digital noise rejection filter on all flex I/O points configured as inputs **I/O1+/-:** When configured as input, optically isolated, 5-24 volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 2 MHz. Function: Step, CW step, A quadrature (encoder following), CW jog, start/stop (oscillator mode), Enable or general purpose input. When configured as output, optically isolated, 30V/100 mA max. Function: Fault, brake motion, tach, or general purpose programmable. **I/O2+/-:** When configured as input, optically isolated, 5-24 volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 2 MHz. Function: Direction, CCW step, B quadrature (encoder following), CW jog, direction (oscillator mode), alarm/ fault reset or general purpose input. When configured as output, optically isolated, 30V/100 mA max. Function: Fault, brake motion, tach, or general purpose programmable. **I/O3+/-:** When configured as input, optically isolated, 5-24 volt. Minimum pulse width = 100 µs. Maximum pulse frequency = 10 KHz. Function: CW limit, Enable, Speed 1/Speed 2 (oscillator mode) or general purpose input. When configured as output, optically isolated, 30V/100 mA max. Function: Fault, brake motion, tach, or general purpose programmable. **I/O4+/-:** When configured as input, optically isolated, 5-24 volt. Minimum pulse width = 100 µs. Maximum pulse frequency = 10 KHz. Function: CCW limit, alarm/fault reset or general purpose input. When configured as output, optically isolated, 30V/100 mA max. Function: Fault, brake motion, tach, or general purpose programmable.
Digital Input Ethernet models	Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/- :** Optically isolated, 5-24 volt. Minimum pulse width 250 ns. Maximum pulse frequency = 2MHz Function: Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), or general purpose input. **DIR+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 2 MHz. Function: Direction, CCW step, B quadrature (encoder following), CW limit, CW jog, direction (oscillator mode), or general purpose input. **EN+/- :** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs. Maximum pulse frequency = 10 KHz. Function: Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), or general purpose input
Digital Input CANopen models	Adjustable bandwidth digital noise rejection filter on all inputs **IN1+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 2 MHz. Function: CW limit, CW jog, or general purpose input **IN2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 2 MHz. Function: CCW limit, CCW jog, or general purpose input **IN3+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs. Maximum pulse frequency = 10 KHz. Function: general purpose input
Digital Output	**OUT+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, or general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits.(Not present on STM24C)
Communication	SF/QF type: RS-232, RS-485 or Modbus/RTU S/Q type: Ethernet TCP or UDP C type: CANopen & RS-232 IP type: EtherNet/IP
Physical	
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heat sink
Humidity	90% non-condensing
Mass	STM24□-3□□: 1580 g
Rotor Inertia	STM24□-3□□: 900 g•cm^2

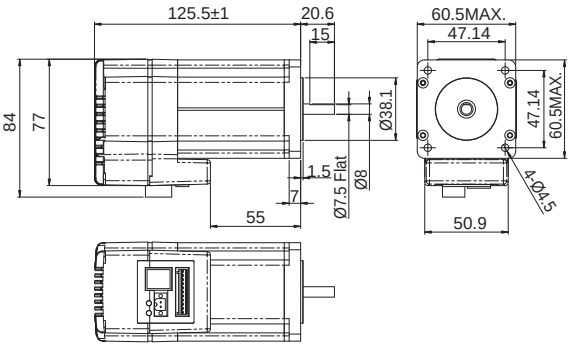
Connector Pin-out

	RS232	RS485 Modbus	CANopen	Ethernet
Communications Port	 RJ11	GND TX- TX+ RX- RX+	GND RX TX GND CANL CANH	 RJ45
I/O Port	I/O1+ I/O1 - I/O2+ I/O2 - I/O3+ I/O3 - I/O4+ I/O4 - +5V AIN GND	I/O1+ I/O1 - I/O2+ I/O2 - I/O3+ I/O3 - I/O4+ I/O4 - +5V AIN GND	IN1+ IN1 - IN2+ IN2 - IN3+ IN3 - OUT+ OUT -	STEP+ STEP - DIR+ DIR - EN+ EN - OUT+ OUT - +5V AIN GND

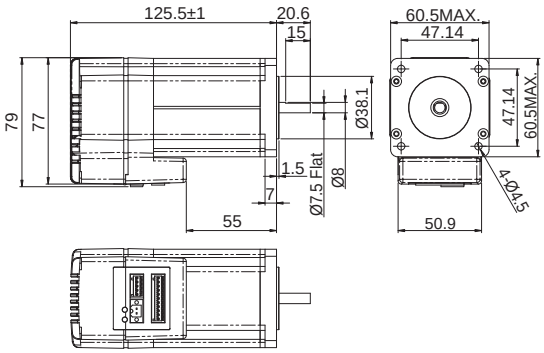
Dimensions(Unit:mm)

Visit www.moonsindustries.com to get the 3D drawing.

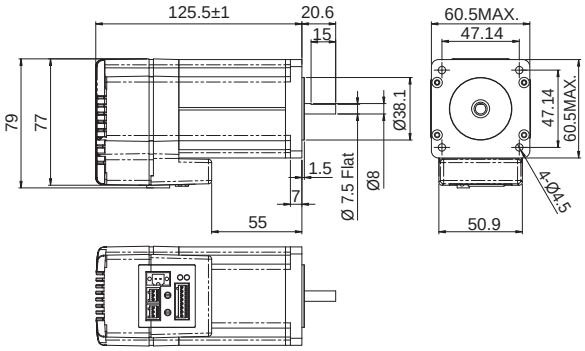
STM24SF-3A□ & STM24QF-3A□



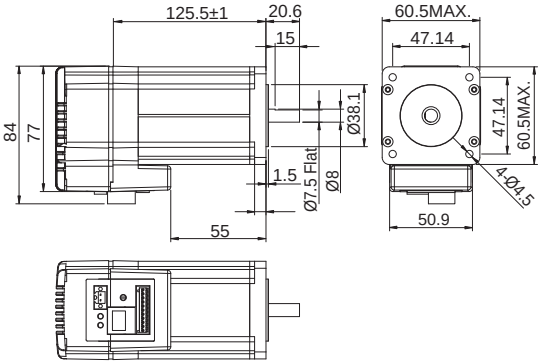
STM24SF-3R□ & STM24QF-3R□



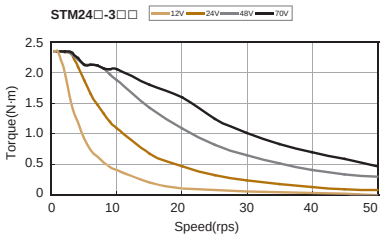
STM24C-3C□



STM24S-3E□ & STM24Q-3E□ & STM24IP-3E□



Torque Curves



Numbering System

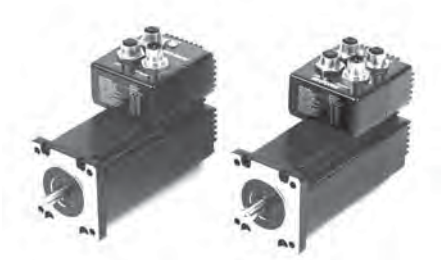
STM 24 S □- 3 A N

- STM Series
- Frame Size Nema 24
- Control
  - S=Basic Type
  - Q=Q Program Type (Modbus/RTU)
  - C=CANopen Type
  - IP=Ethernet/IP Type
- Blank = Standard
  - F = Flex I/O(only RS232/RS485)
- Motor Size
  - 3=3 Stack
- Communications
  - A=RS-232
  - R=RS-485
  - C=CANopen
  - E=Ethernet
- Feedback
  - N=None
  - E=1000-line encoder

Ordering Information

Model	Control	Output Torque	Encoder	RS-232	RS-485	Modbus/RTU	CANopen	Ethernet	EtherNet/IP
STM24SF-3AN	S	2.4N·m		✓					
STM24SF-3RN					✓				
STM24SF-3AE			✓	✓					
STM24SF-3RE			✓		✓				
STM24S-3EN								✓	
STM24S-3EE			✓					✓	
STM24QF-3AN	Q	2.4N·m		✓					
STM24QF-3RN					✓	✓			
STM24QF-3AE			✓	✓					
STM24QF-3RE			✓		✓	✓			
STM24Q-3EN								✓	
STM24Q-3EE			✓					✓	
STM24C-3CN	C	2.4N·m		✓			✓		
STM24C-3CE			✓	✓			✓		
STM24IP-3EN	IP								✓
STM24IP-3EE			✓						✓

IP65 Type Integrated Stepper Motor-SWM Series



Drive + **Motor** + **Controller**

The SWM is an integrated Drive+Motor+Controller with IP65 of ingress protection against dust and water, fusing step motor and drive technologies into a single device, offering savings on space, wiring and cost over conventional motor and drive solutions.

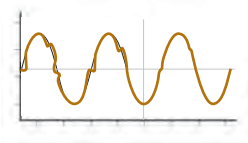
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation
- ✓ Stall Detection and Stall Prevention

Features

Anti-Resonance

Step motor systems have a natural tendency to resonate at certain speeds. The SWM integrated motors automatically calculate the system's natural frequency and apply damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.

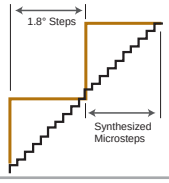
Provides better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low resolution step pulses and create fine resolution motion.

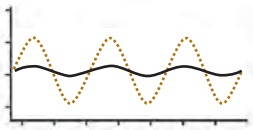
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion profile of the motor. By analyzing this torque ripple the system can apply a negative harmonic to counter this effect. This gives the motor much smoother motion at low speed.

Produces smoother motion at lower speeds



Command Signal Smoothing

Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

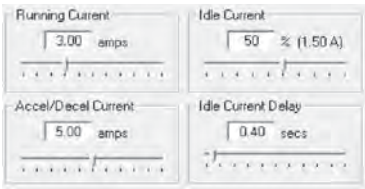
Improves smoother system performance

Dynamic Current Control

Allows for three current settings to help the motor run cooler and reduce power consumption.

- Running Current - the current the drive will deliver for continuous motion.
- Accel Current - the current the drive will deliver when accelerating or decelerating.
- Idle Current - reduces current draw when motor is stationary.

System runs cooler

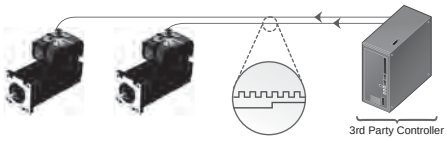


Stall Detection & Stall Prevention

The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Control Options

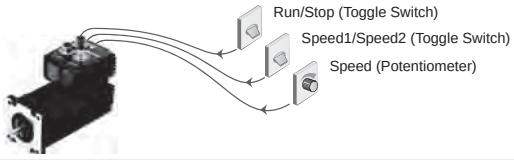
Step & Direction



S

- Step & Direction
- CW & CCW pulse
- A/B quadrature (master encoder)

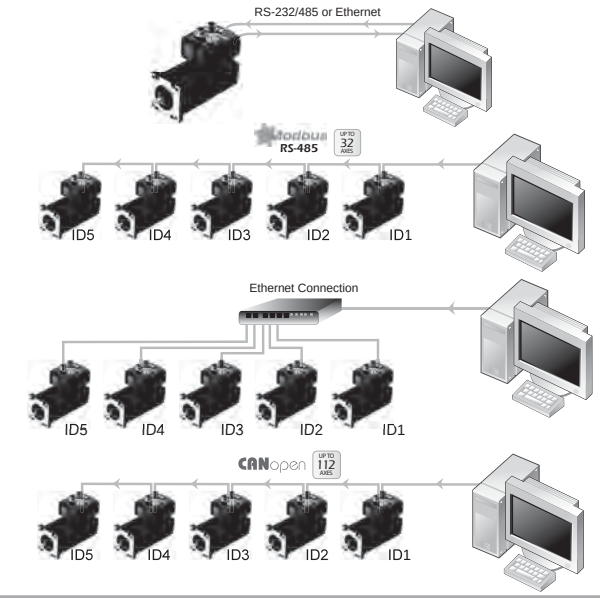
Oscillator / Run-Stop



S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

Host Control



S & Q

RS-232

- Accepts commands from host PC or PLC

RS-485 or Modbus/RTU network

- Accepts commands from host PC or PLC
- Multi-axis capable, up to 32 axes

Q & IP

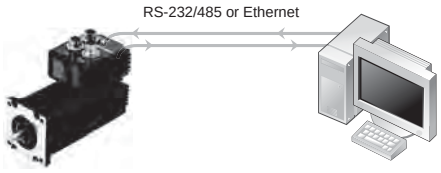
- Accepts commands from host PC or PLC
- 1000's of axes with Ethernet and Ethernet/IP

C

CANopen Model

- Connect to CANopen network
- CiA301 and CiA402 protocols
- Multi-axis capable, up to 112 axes

Stand Alone Programmable



Q & IP

- Comprehensive text based languaged
- Download, store & execute programs
- High level features: multi-tasking, conditional programming and math functions
- Host interface while executing stored programs

SWM24 - IP65 controller type integrated stepper motor

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	SWM24□-3□□: Up to 2.4N•m
Power Supply	External 12 - 70 volt power supply required
Protection	Over-voltage, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)

CE RoHS

Controller	
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Feedback	Optional 4000 counts/rev encoder feedback
Speed Range	Speeds up to 3000 rpm
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	SWM24S: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) SWM24Q: All SWM24S modes of operation plus stored Q program execution SWM24C: CANopen slave node plus stored Q Program execution SWM24IP: All SWM24Q modes of operation plus EtherNet/IP industrial network communications
Digital Input SF and QF models	Adjustable bandwidth digital noise rejection filter on all I/O points configured as inputs **IN1+/-:** optically isolated, 5-24 volts, minimum pulse width 250 ns., maximum pulse frequency 2 MHz Function: Step, CW step, A quadrature (encoder following), CW jog, start/stop (oscillator mode), Enable or general purpose input **IN2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW jog, direction (oscillator mode), alarm/fault reset or general purpose input **IN3+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: CW limit, Enable, speed 1/speed 2 (oscillator mode) or general purpose input **IN4+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: CCW limit, alarm/fault reset or general purpose input
Digital Output SF/QF models	**OUT1+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **OUT2+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **OUT3+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **OUT4+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable
Digital Input S/Q Ethernet models	Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** optically isolated, 5-24 volts, minimum pulse width 250 ns., maximum pulse frequency 2 MHz Function: Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), or general purpose input **DIR+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), or general purpose input **EN+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), or general purpose input
Digital Input S/Q Ethernet models	**OUT+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable
Digital Input C models	Adjustable bandwidth digital noise rejection filter on all inputs **X1+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CW limit, CW jog, or general purpose input **X2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: CCW limit, CCW jog, or general purpose input **X3:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: general purpose input **X4:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: general purpose input **X5:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: general purpose input

Digital Output C models	**Y1+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **Y2+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **Y3+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits. (Not present on SWM24C).
Communication	S Model: RS-232, RS-485 or Ethernet Q Model: RS-232, RS-485, Ethernet or Modbus/RTU C Model: CANopen, RS-232 IP Model: EtherNet/IP
Physical	
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heat sink
Humidity	90% non-condensing
Mass	SWM24□-3□□: 1800 g
Rotor Inertia	SWM24□-3□□: 900 g•cm^2

Connection interface

Power Port

Pin.	Description
1	Power Supply+
2	Power Supply-
3	Power Supply+
4	Power Supply-

RS-232 Communication Port

Pin.	Description
1	Data Receive RX
2	+5V 50mA
3	Data Transmit TX
4	GND
5	NC

RS-485 or Modbus Communication Port

Pin.	Description
1	Data Receive RX+
2	Data Receive RX-
3	Data Transmit TX+
4	Data Transmit TX-
5	GND

CAN Communication Port

Pin.	Description
1	Serial Transmit TX
2	Serial Receive RX
3	GND
4	CAN H
5	CAN L

Ethernet Communication Port

Pin.	Description
1	Data Transmit TX+
2	Data Receive RX+
3	Data Transmit TX-
4	Data Receive RX-

I/O Port

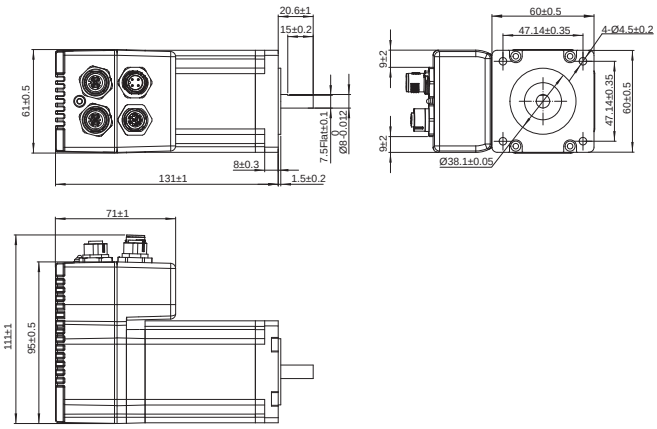
S/Q/IP Type		C Type	
Pin.	Description	Pin.	Description
1	STEP+	1	Input X1+
3	STEP -	3	Input X1 -
5	DIR+	6	Input X4
8	DIR-	4	Input X3
6	EN+	5	Input X2+
4	EN-	8	Input X2 -
11	OUT +	7	Input X5
12	OUT-	10	XCOM
9	+5V 50mA	11	Output Y1
2	N/C	12	Output Y2
10	AIN	9	Output Y3
7	GND	2	YCOM

Numbering System

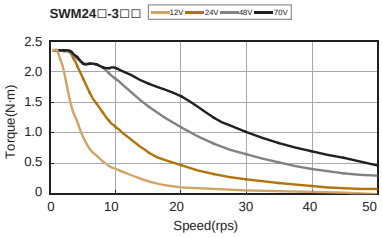
SWM 24 S□- 3 A N

- Series: SWM
- Frame Size Nema 24: 24
- Control: S=Basic Type; Q=Q Program Type (Modbus/RTU); C=CANopen Type; IP=EtherNet/IP Type
- Blank = Standard; F = Flex I/O(only RS232/RS485)
- Motor Size: 3=3 Stack
- Communications: A=RS-232; R=RS-485; C=CANopen; E=Ethernet
- Feedback: N=None; E=1000-line encoder

Dimensions(Unit:mm)



Torque Curves



Ordering Information

Model	Torque	Control	Encoder	RS-232	RS-485	Modbus/RTU	CANopen	Ethernet	EtherNet/IP	Daisy Chain
SWM24SF-3AN	2.4N·m	S		✓						
SWM24SF-3AE			✓	✓						
SWM24SF-3RN					✓					✓
SWM24SF-3RE			✓		✓					✓
SWM24S-3EN								✓		
SWM24S-3EE			✓					✓		
SWM24QF-3AN		Q		✓						
SWM24QF-3AE			✓	✓						
SWM24QF-3RN					✓	✓				✓
SWM24QF-3RE			✓		✓	✓				✓
SWM24Q-3EN								✓		
SWM24Q-3EE			✓					✓		
SWM24C-3CN		C					✓			✓
SWM24C-3CE			✓				✓			✓
SWM24IP-3EN		IP							✓	
SWM24IP-3EE			✓						✓	

2-Phase Stepper Drive

2 Phase Stepper Motor Drive

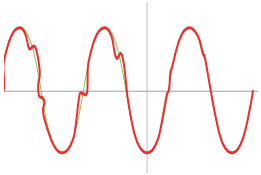
Step motor drives from MOONS' offer unparalleled performance for today's modern machine builders. From the ground-up these drives offer best-in-class current control for optimal smoothness and torque, robust and flexible on-board control options, and industry-standard industrial network communications.

Features

Anti-Resonance/Electronic Damping

Step motor systems have a natural tendency to resonate at certain speeds. MOONS' Stepper Drive automatically calculates the system's natural frequency and applies damping to the control algorithm. This greatly improves midrange stability, allows for higher speeds, greater torque utilization and also improves settling times.

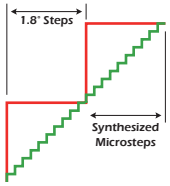
Delivers better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low-resolution step pulses and create fine resolution micro-step motion.

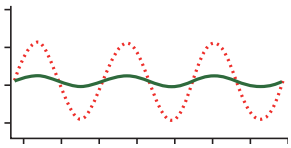
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion of the motor. By analyzing this torque ripple the system can apply a negative harmonic to negate this effect, which gives the motor much smoother motion at low speed.

Delivers smoother motion at lower speeds



Command Signal Smoothing

Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

Improves overall system performance

Stall Detection & Stall Prevention for STAC and ST

The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Stall Detection notifies the system as soon as the required torque is too great for the motor, resulting in a loss of synchronization between the rotor and stator, also known as stalling. As soon as the motor stalls the drive triggers its fault output.

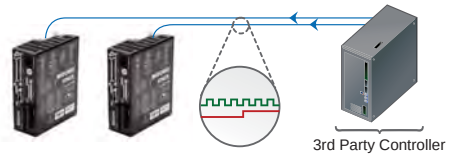
Stall Prevention automatically adjusts the excitation of the motor windings to maintain synchronization of the rotor and stator under all conditions. This means that motor position is maintained and corrected even when the required torque is too great for the motor. The stall prevention feature also performs position maintenance, which maintains the position of the motor shaft when at rest.

Self Test & Auto Setup

At start-up the drive measures motor parameters, including the resistance and inductance, then uses this information to optimize the system performance

Control Options for STAC and ST

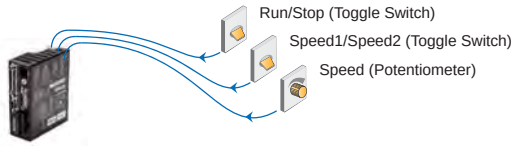
Step & Direction



S

- Step & Direction
- CW & CCW pulse
- A/B quadrature (master encoder)

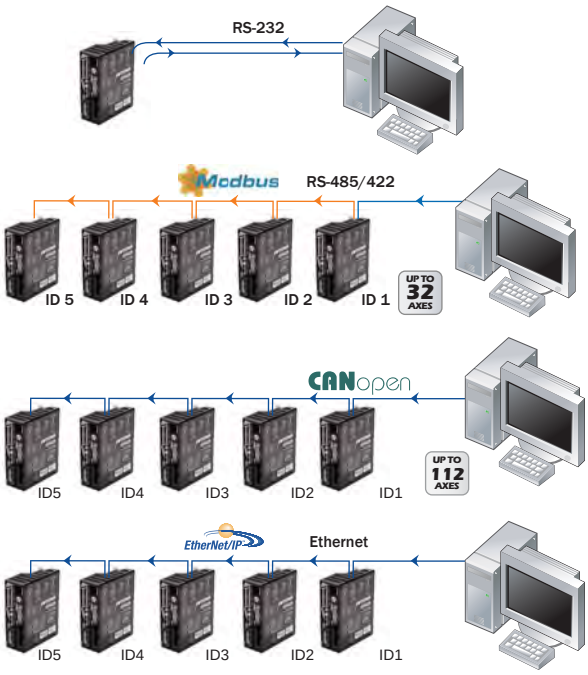
Oscillator / Run-Stop



S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

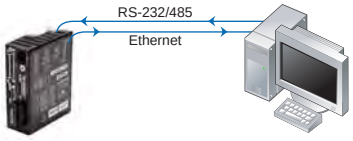
Host Control



S Q C IP

- Accepts commands from host PC or PLC
- Multi-axis capable
- Real time control

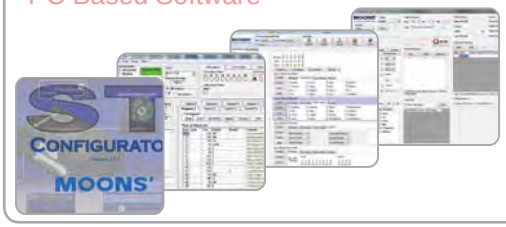
Stand Alone Programmable



Q

- Accepts commands from host PC or PLC
- Multi-axis capable
- Real time control

PC Based Software



MOONS' STAC and ST products support following software application make it easy to configure, testing and evaluation.

- ST Configurator
- Q Programmer
- RS485 Bus Utility
- CANopen Test Tool

Overview of Two Phase Stepper Drive

SRAC Series - AC Input Stepper Drive

Position Control

Input Voltage(Typical): AC120V/240V
Drive Output Current: Up to 8Amp(Peak of Sine)
Microstep Resolution: Switch set, up to 25600 steps/rev
Control Modes:
- Pulse Control

Inputs and Outputs:
- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size: 56mm, 60mm, 86mm

STAC Series - AC Input Controller Type Stepper Drive

Position Control
Velocity Control

Input Voltage(Typical): AC120V/240V
Drive Output Current: Up to 2.5Amp(Peak of Sine)
Encoder Option: Incremental
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- S/C/Q-R Type- 4 Digital Inputs, 2 Digital Outputs, 1 Analog Input
- Q-A/IP Type- 12 Digital Inputs, 6 Digital Outputs, 1 Analog Input

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

Supported Motor Frame Size: 56mm, 60mm, 86mm

SR Series - DC Input Stepper Drive

Position Control

Input Voltage(Typical): DC24V/48V
Drive Output Current: Up to 7.8Amp(Peak of Sine)
Microstep Resolution: Switch set, up to 51200 steps/rev
Control Modes:
- Pulse Control

Inputs and Outputs:
- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size:
- 28mm, 35mm, 42mm, 56mm, 60mm, 86mm

ST Series - DC Input Controller Type Stepper Drive

Position Control
Velocity Control

Input Voltage(Typical): DC24V/48V
Drive Output Current: Up to 10Amp(Peak of Sine)
Encoder Option: Incremental
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

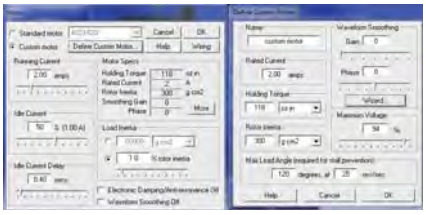
Inputs and Outputs:
- S type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- Q/C/IP- 8 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs

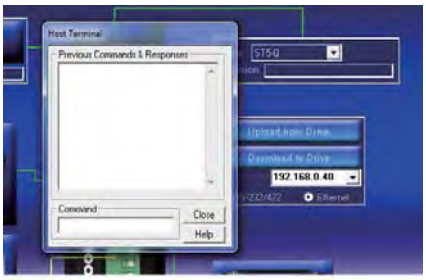
Communication:
SCL CANopen eSCL EtherNet/IP Modbus

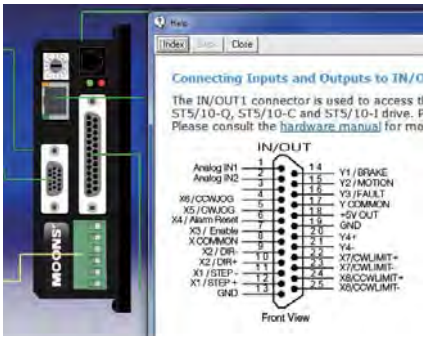
Supported Motor Frame Size:
- 28mm, 35mm, 42mm, 56mm, 60mm, 86mm

ST Configurator

Software







Software Features

- Intuitive interface
- Drive status and alarm monitoring
- Self-test function to test drive/motor operation
- Built-in SCL Terminal
- Online help integrated
- Supports all STAC and ST stepper drives

About this software

The ST Configurator software makes setting up, configuring and programming STAC and ST stepper drives a snap. All motor, I/O, encoder and motion control parameters are available to the user through an intuitive interface. The ST Configurator provides seamless communication with all models whether they have RS-232, RS-485, CANopen or Ethernet communications. It also includes a built-in Q Programmer so you can switch context quickly and easily.

System Requirements

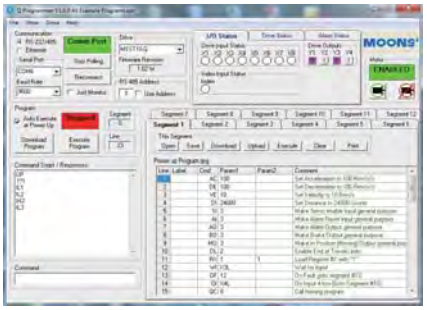
Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

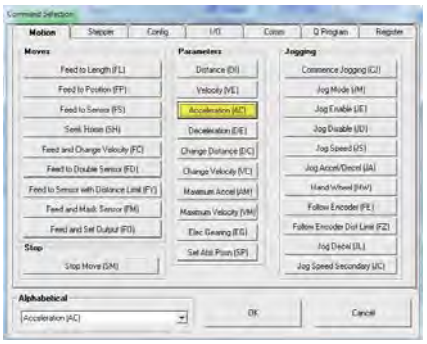
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

Q Programmer

Software





Software Features

- Single-axis motion control
- Stored program execution
- Multi-tasking
- Conditional processing
- Math functions
- Data registers
- Motion Profile simulation
- Online help integrated
- Support all Q/C/IP Types stepper drives in STAC/ST Series

About this software

Q Programmer is a single-axis motion control software for programmable stepper and servo drives from MOONS'. The software allows users to create sophisticated and functional programs that Q and Plus drives can run stand-alone. The commands available in the Q programming environment consist of commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

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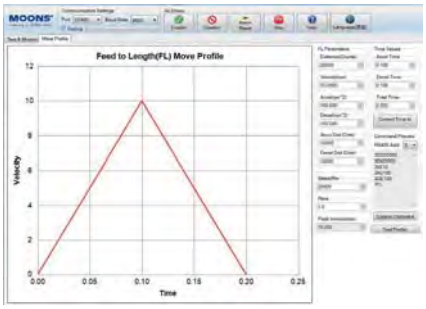
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

RS485 Bus Utility

Software



Software Features

- Stream SCL commands from the command line
- Simple interface with powerful capability
- Easy setup with RS-485 for 32 axis network motion control
- Monitoring Status of I/O, drive, alarm and the other nine most useful motion parameters
- Write and save SCL command scripts
- Online help integrated
- Supports all RS-485 drives

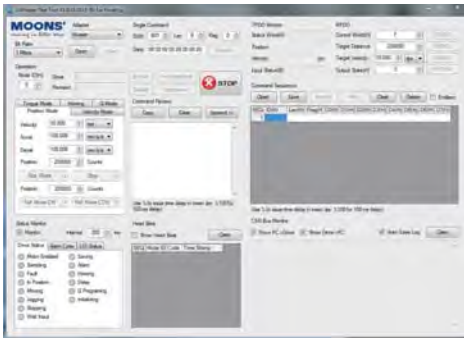
About this software:

If you plan to stream serial commands to MOONS' drive using the Serial Command Language (SCL), to build an RS-485 multi-axis network, you'll need a simple terminal emulator to get familiar with and test your command strings and test the network. RS-485 Bus Utility is the ideal choice because it sends command strings as a packet, with minimal delay between characters, and properly terminated with a carriage return. Other terminal applications send each character as it's typed, making them difficult to use with SCL commands.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

CANopen Test Tool



Software Features

- Friendly User Interface
- Multiple operation Mode Support
- Multi-Thread, High Performance
- CAN bus monitor and log function
- Kvaser/PEAK/ZLG adapter support

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

AC Input Step Motor Drive-SRAC Series

SRAC Series

The SRAC series are compact, powerful, digital stepper drives feature advanced microstepping performance and sophisticated current control.All drive setup is done via dip or rotary switches.

The SRAC provides enhanced high-speed characteristics compared with a DC input driver.

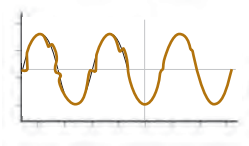
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation

Features

Anti-Resonance/Electronic Damping

Step motor systems have a natural tendency to resonate at certain speeds. The SRAC drives automatically calculates the system's natural frequency and applies damping to the control algorithm. This greatly improves midrange stability, allows for higher speeds, greater torque utilization and also improves settling times.

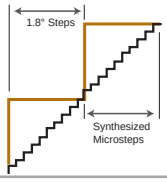
Delivers better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low-resolution step pulses and create fine resolution micro-step motion.

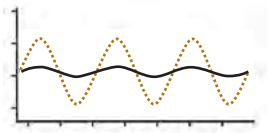
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion of the motor. By analyzing this torque ripple the system can apply a negative harmonic to negate this effect, which gives the motor much smoother motion at low speed.

Delivers smoother motion at lower speeds



Command Signal Smoothing

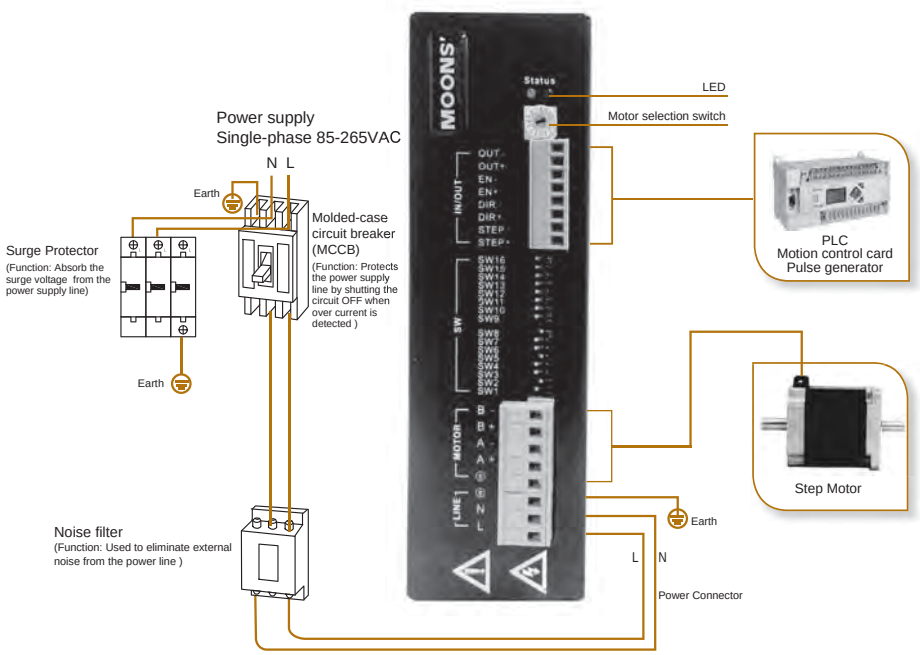
Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

Improves overall system performance

Self Test & Auto Setup

At start-up the drive measures motor parameters, including the resistance and inductance, then uses this information to optimize the system performance.

System Configuration



Numbering System

SRAC - 2

Series

Max. Current
2=2.5A
4=4.0A
8=8.0A

Ordering Information

Model	Current	Input Voltage	Microstep Selection	Current Selection
SRAC2	0.6-2.5A	80-265VAC	16	8
SRAC4	0.4-4.0A	80-265VAC	16	16
SRAC8	0.4-8.0A	80-265VAC	16	16

Drive Specifications

Specification	
Speed Range	Up to 3000RPM
Operating Temperature	0 - 40°C
Ambient Humidity	90% or less(non-condensing)
Vibration Resistance	5.9m/s² maximum
Storage Temperature	-10 - 70°C
Heat Sinking Method	Natural cooling or fan-forced cooling
Atmosphere	Avoid dust, oily mist and corrosive air
Mass	SRAC2: Approx. 0.8Kg
	SRAC4/SRAC8: Approx. 1.2Kg
Certification	RoHS, CE (EMC): EN 61800-3:2004, CE(LVD): EN61800-5-1:2007
Features	
Idle Current	Automatic idle current reduction to reduce heat after motor stops moving for 1 second Dip switch selectable, 4 selection 25%,50%,70%,90% for SRAC4/8, 2 selection 50%,90% for SRAC2
Anti-Resonance	Raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor, dip switch selectable load inertia
Control Mode	Dip switch selectable Step&Dir or CW/CCW Pulse
Inupt Signal Filter	Digital filters prevent position error from electrical noise on command signals, Dip switch selectable 2MHz or 150KHz
Microstep Emulation	Switch selectable microstep emulation provides smoother, more reliable motion
Motor Database	Rotary switch easily selects from many popular motors
Self Test	Switch selectable automatic self test, while self test, drive will rotate the motor back and forth, two turns in each direction.
Protection	Over voltage, under voltage, over temperature, over current, open motor winding
Fault Output	Optically isolated,30VDC max, 100MA max

Electrical Specifications

SRAC2

Parameter	Min.	Typ.	Max.	Units
Power Supply	80	-	265	VAC
Output Current (Peak)	0.6	-	2.5	Amps
Cost current of digital input signal	6	10	15	mA
Step Signal Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	75*/135*	-	VAC
Over Voltage Protection	-	145*/295*	-	VAC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

***Note:** When the AC input switch is selected on 115V, under voltage protection point is 75VAC, over voltage protection point is 145VAC. When the input switch is selected on 230V status, under voltage protection point is 135VAC, over voltage protection point is 295VAC.

SRAC4/8

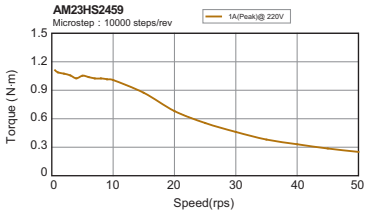
Parameter	Min.	Typ.	Max.	Units	单位
Power Supply		80	-	265	VAC
Output Current (Peak)	SRAC4	0.4	-	4	Amps
	SRAC8	0.4	-	8	Amps
Cost current of digital input signal		6	10	15	mA
Step Signal Frequency		2	-	2M	Hz
STEP minimum pulse width		250	-	-	ns
DIR minimum pulse width		80	-	-	us
Under Voltage Protection		-	80	-	VAC
Over Voltage Protection		-	295	-	VAC
Input Signal Voltage		4	-	28	VDC
Initialization time		-	-	2.5	S
OUT maximum output current		-	-	100	mA
OUT maximum voltage		-	-	30	VDC

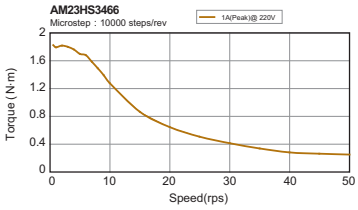
Recommended Motors

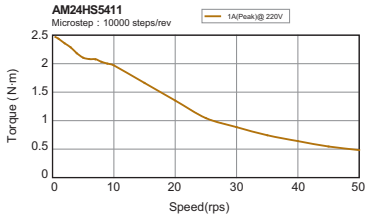
Model	Shaft	Wiring	Leads	Step angle	Length"L"	Holding Torque	Current (A/Phase)		Resistance (Ω/Phase)		Rotor Inertia	Motor Mass	Dielectric Strength
					mm	N·m	Series	Parallel	Series	Parallel	g·cm²	Kg	
AM23HS2459-01	Single Shaft	A	4	1.8°	54	1.1	1	-	16.6	-	260	0.6	1500VAC 1 minute
AM23HS3466-01	Single Shaft				76	1.8		-	25.4	-	460	1	
AM24HS5411-01N	Single Shaft				85	2.5		-	15.4	-	900	1.4	
AM34HD0802-01	Single Shaft	C	8		66.5	3	1.8	3.6	3.4	0.9	1100	1.6	
AM34HD0802-02	Double Shaft												
AM34HD4802-01	Single Shaft				75	3.5			3.6	0.9	1350	1.9	
AM34HD1802-01	Single Shaft				96	5			3.6	0.9	1850	2.7	
AM34HD1802-03	Double Shaft												
AM34HD6801-01	Single Shaft				115	6.5			4	1	2400	3.5	
AM34HD2805-01	Single Shaft				125.5	7.1			4.2	1	2750	3.8	
AM34HD2805-03	Double Shaft												

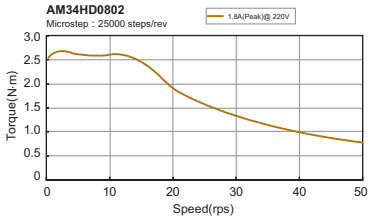
* Wiring Diagram A, C See Page 195

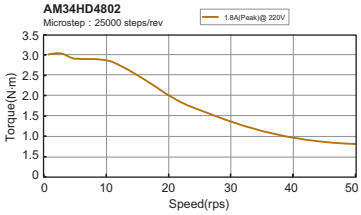
Torque Curves

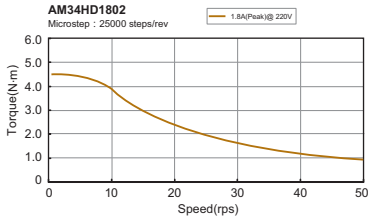


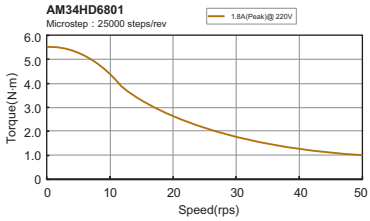


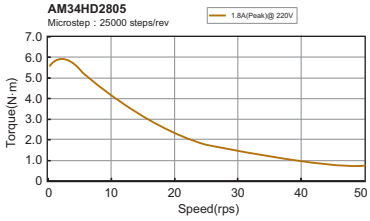






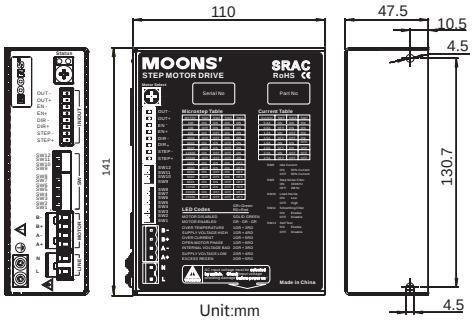




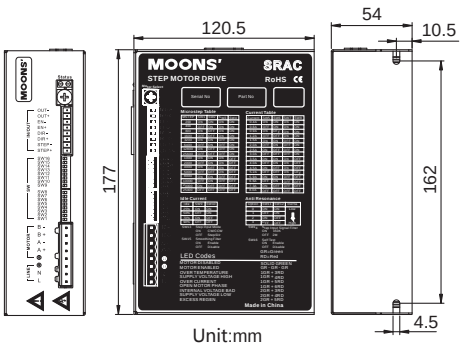


Dimensions(Unit:mm)

◇ SRAC2

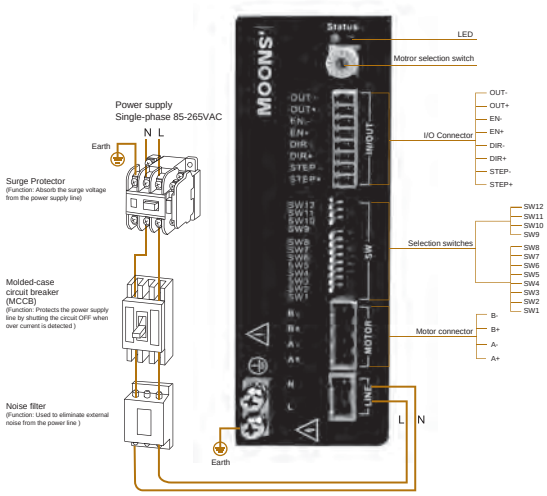


◇ SRAC4/8



Connection and Operation(SRAC2)

Wiring Diagram



Connecting the power supply

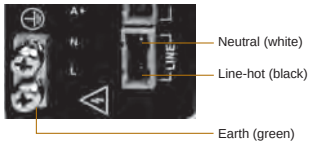
Use the supplied connector to connect to the AC supply according to the diagram below. Use 16 AWG wire for Line (L) and Neutral (N). Use 14 AWG for Earth Ground (G).

AC input voltage must be selected by switch. Check input voltage avoiding damage before power on!

80VAC<Input AC Voltage<135VAC: set the switch on 115V Status

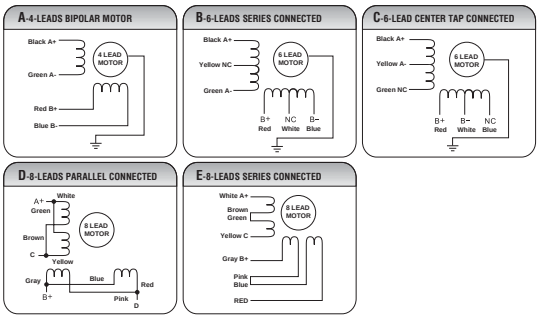
135VAC<Input AC Voltage<265VAC: set the switch on 230V Status

The SRAC2 contains an internal 10A fast acting fuse.



Care should always be taken when working with high voltages.

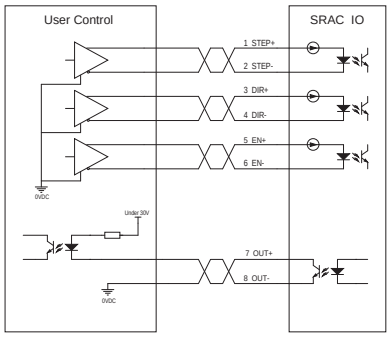
Connecting to motor



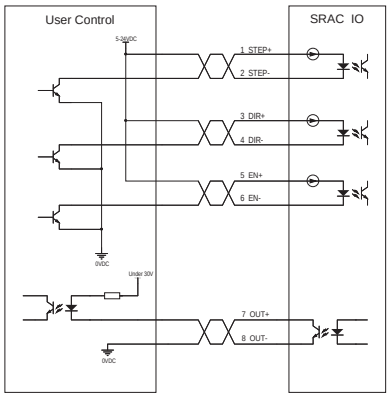
When driving 8 leads motor, using series connection when input voltage is 220VAC, using parallel connection when input voltage is 110VAC.

Digital I/0 Circuit and Sample Connection

- With Line Driver Output



- With Open Collector Output



Description of Input/Output Signals

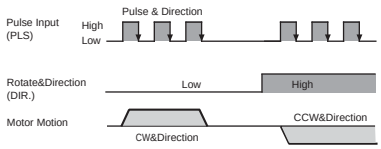
Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

Pulse Input Mode

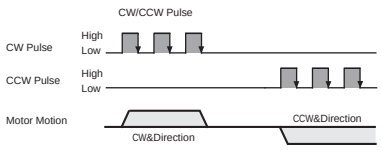
Pulse & Direction

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step in CW direction. When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in CCW direction.

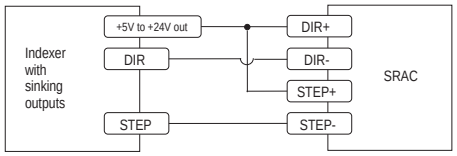


CW & CCW Pulses

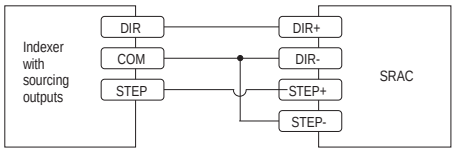
When CW input received a falling edge pulse (High to Low), CCW input Low (or floating), motor rotates one step in CW direction.
When CCW input received a falling edge pulse (High to Low), CW input Low (or floating), motor rotates one step in CCW direction.



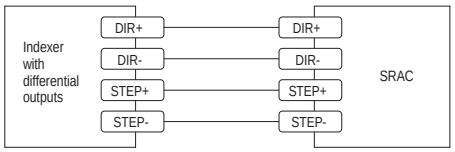
- Sample Connection



Connecting to indexer with sinking outputs



Connecting to indexer with sourcing outputs



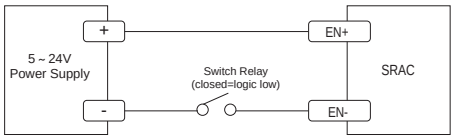
Connecting to indexer with differential outputs

◇ EN Input

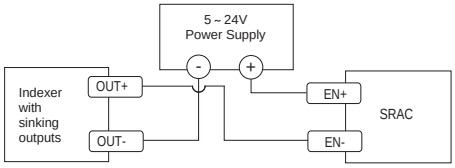
The EN input enables or disables the drive amplifier. When EN input is ON the drive amplifier is deactivated. All the MOSFETs will shut down, and the motor will be free. When EN input is OFF, the drive is activated.

A falling signal into the EN input will reset the error status and activate the drive amplifier again.

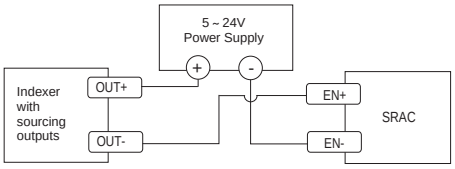
- Sample Connection



Connecting the input to a switch or relay



Connecting the input to sinking outputs



Connecting the input to sourcing outputs

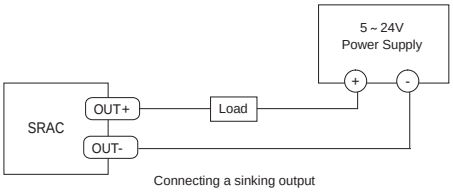
◇ Fault Output

The FAULT Output is optically isolated. The maximum collector current is 100mA, and the maximum collector to emitter voltage is 30 volts. The output can be wired to sink or source current.

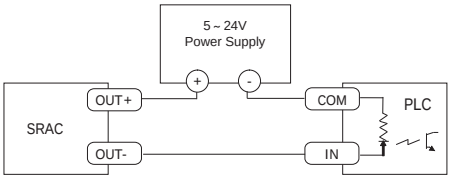
When drive is working normally, the output is open.

When the drive encounters an error, the output closes.

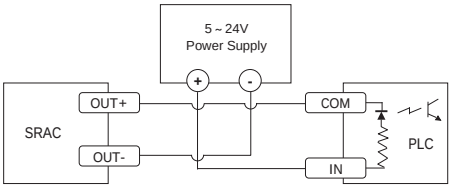
- Sample Connection



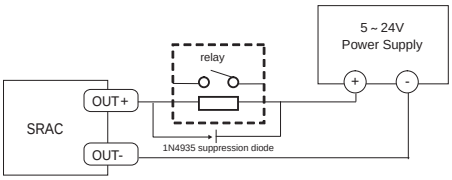
Connecting a sinking output



Connecting a souring output



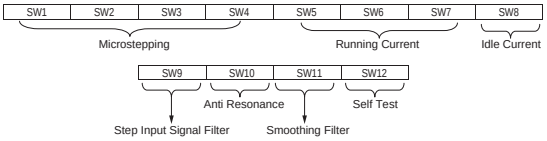
Connecting PLC souring output



Driving a relay

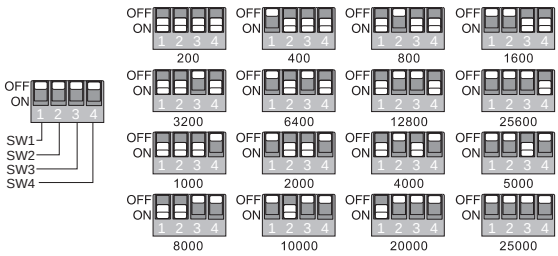
■ Switch Selecting

Many of the operational parameters of the SRAC2 can be set or changed by position switches - either by a single switch or a combination of ON/OFF settings of 2 or more switches.



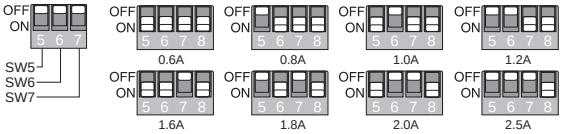
◇ Microstepping

The microstep resolution is set by the SW1, SW2, SW3 and SW4 switches. There are 16 settings.



◇ Running Current

The output current of the SRAC2 Step Drive is set by the SW5, SW6, and SW7 switches and can be changed as necessary. There are 8 settings available according to the ON/OFF combination of the switches.



◇ Idle Current

The running current of the SRAC2 drive is automatically reduced whenever the motor hasn't moved for 1 second. Setting the SW8 switch to ON reduces the current to 50% of its running value. Setting this switch to OFF maintains 90% of the running current. This 90% setting is useful when a high holding torque is required. To minimize motor and drive heating it is highly recommended that the idle current reduction feature be set to 50% unless the application requires the higher setting.

◇ Digital Input Filter

Switch SW9 sets the digital signal filter. Setting switch to "OFF" will select high frequency 2MHz, and setting switch to "ON" will select low frequency 150 KHz.

Note: The setting will take effect after recycle the power.

◇ Anti Resonance

The SW10 switches select the load inertia. SW10 ON selects low load inertia as well as SW10 OFF selects high load inertia.

◇ Command Signal Smoothing

Command signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components. SW11 selects this function - ON enables it, OFF disables it.

This function can cause a small delay in following the control signal, and it should be used with that in mind.

Note: The setting will take effect after recycle the power.

◇ Self Test

Setting switch SW12 to ON after the drive is powered up will cause the drive to perform a self test rotate the motor back and forth, two turns in each direction, setting switch SW12 to OFF will disable this feature.

■ Motor Selection

Each position of the 16-bit rotary switch selects a different motor, and automatically sets the configuration parameters in the drive. The SRAC2 drive comes programmed with up to 16 typical motors as factory defaults. Drives can be customized with specially selected motors when required.

Switch Bit	Motor	Wiring	Motor Current Peak(A)
0	Reserved		None
1	Reserved		None
2	Reserved		None
3	Reserved		None
4	Reserved		None
5	Reserved		None
6	Reserved		None
7	AM23HS2459		1
8	AM23HS3466		1
9	AM24HS5411		1
A	AM34HD0802	Series Connected	1.8
B	AM34HD1802	Series Connected	1.8
C	AM34HD2805	Series Connected	1.8
D	AM34HD4802	Series Connected	1.8
E	AM34HD6801	Series Connected	1.8
F	Motor_SRAC2		1.8

Note: The setting will take effect after recycle the power.

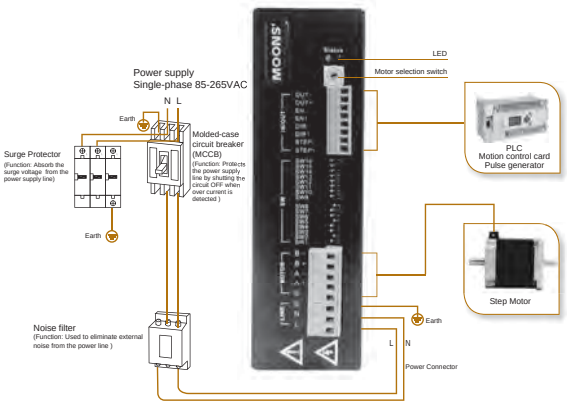
■ LED Error Codes

Code		Error
●	Solid green	Motor disabled
● ●	Flashing green	Motor enabled
● ● ● ●	3 red, 1 green	Over temperature
● ● ● ● ●	3 red, 2 green	Bad internal voltage
● ● ● ● ●	4 red, 1 green	Over voltage
● ● ● ● ● ●	4 red, 2 green	Under voltage
● ● ● ● ● ●	5 red, 1 green	Over current/short circuit
● ● ● ● ● ● ●	5 red, 2 green	Excess Regen
● ● ● ● ● ● ●	6 red, 1 green	Open motor winding

● Show Red; ● Show Green.

Connection and Operation(SRAC4/8)

Wiring Diagram



Connecting the power supply

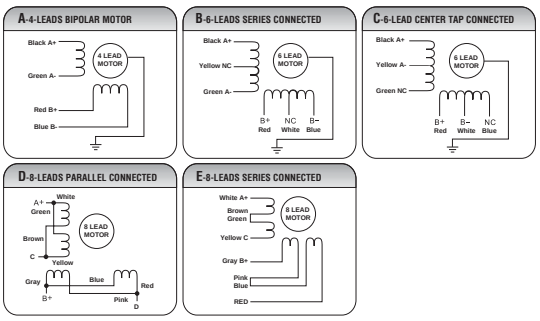
Use the supplied connector to connect to the AC supply according to the diagram below. Use 16 AWG wire for Line (L) and Neutral (N). Use 14 AWG for Earth Ground (G).

Care should always be taken when working with high voltages.

In regions where the single-phase supply is higher, an auto transformer can be used to drop the voltage to the correct level.

The SRAC8 contains an internal 10A fast acting fuse.

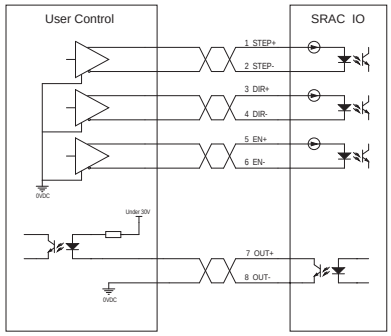
Connecting to motor



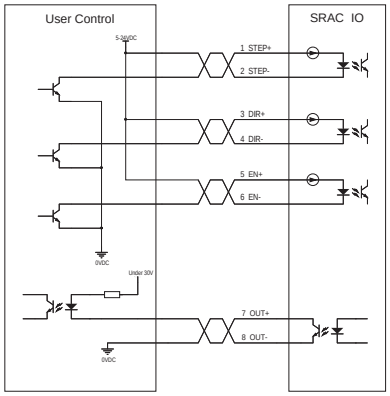
When driving 8 leads motor, using series connection when input voltage is 220VAC, using parallel connection when input voltage is 110VAC.

Digital I/0 Circuit and Sample Connection

- With Line Driver Output



- With Open Collector Output



Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

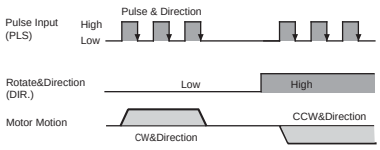
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

Pulse Input Mode

Pulse & Direction

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step in CW direction.

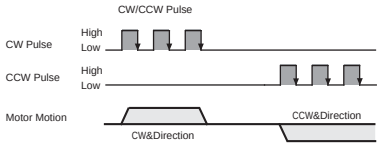
When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in CCW direction.



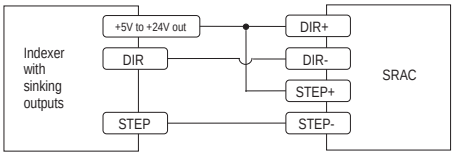
CW & CCW Pulses

When CW input received a falling edge pulse (High to Low), CCW input Low (or floating), motor rotates one step in CW direction.

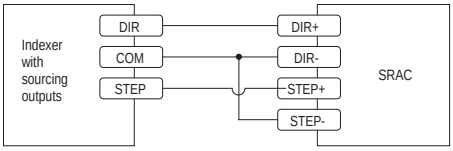
When CCW input received a falling edge pulse (High to Low), CW input Low (or floating), motor rotates one step in CCW direction.



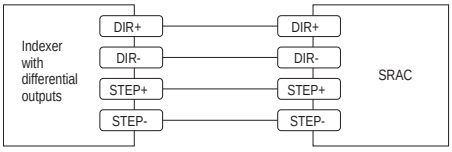
- Sample connection



Connecting to indexer with sinking outputs



Connecting to indexer with sourcing outputs



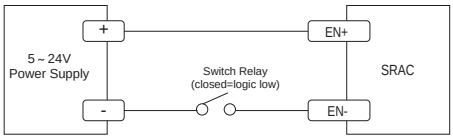
Connecting to indexer with differential outputs

◇ EN Input

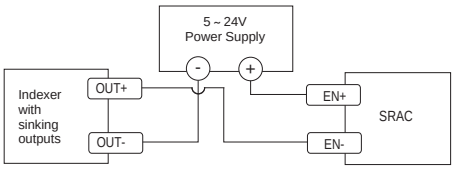
The EN input enables or disables the drive amplifier. When EN input is ON the drive amplifier is deactivated. All the MOSFETs will shut down, and the motor will be free. When EN input is OFF, the drive is activated.

A falling signal into the EN input will reset the error status and activate the drive amplifier again.

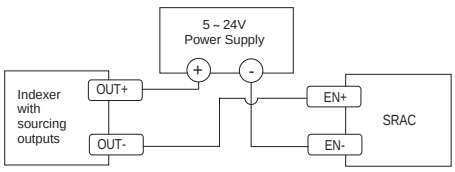
- Sample Connection



Connecting the input to a switch or relay



Connecting the input to sinking outputs



Connecting the input to sourcing outputs

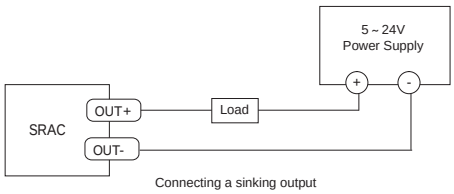
◇ Fault Output

The FAULT Output is optically isolated. The maximum collector current is 100mA, and the maximum collector to emitter voltage is 30 volts. The output can be wired to sink or source current.

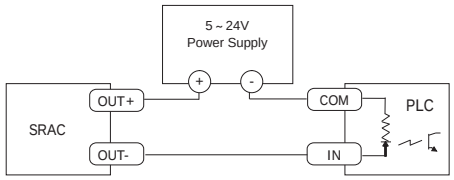
When drive is working normally, the output is open.

When the drive encounters an error, the output closes.

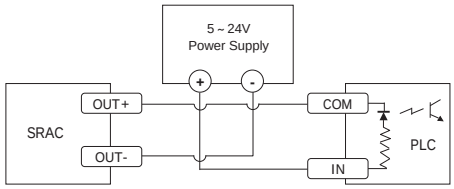
- Sample Connection



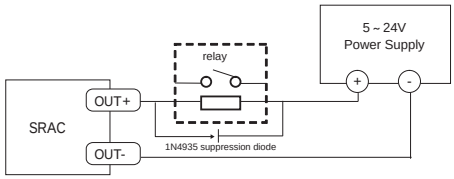
Connecting a sinking output



Connecting a souring output



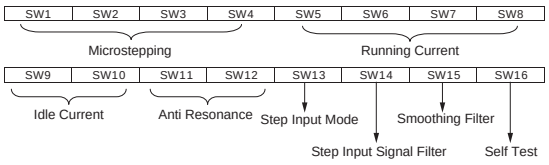
Connecting PLC souring output



Driving a relay

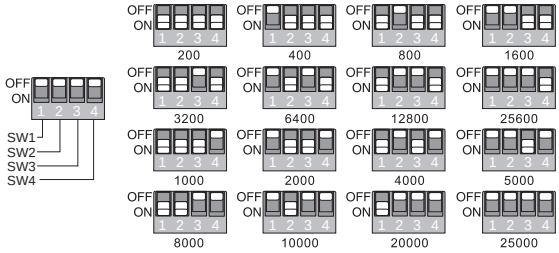
■ Switch Selecting

Many of the operational parameters of the SRAC4/8 can be set or changed by position switches - either by a single switch or a combination of ON/OFF settings of 2 or more switches.



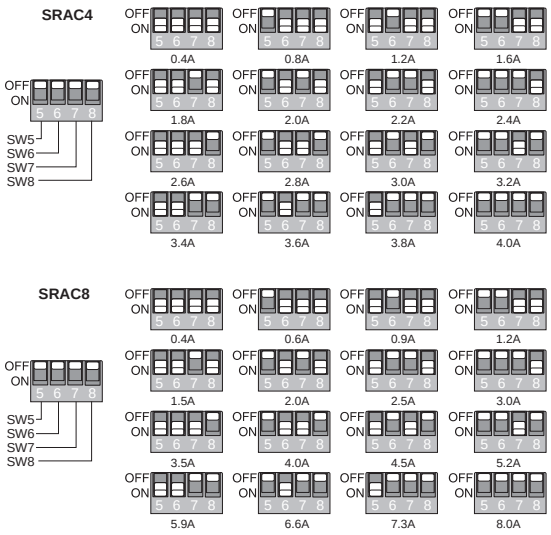
◇ Micostepping

The microstep resolution is set by the SW1, SW2, SW3 and SW4 switches. There are 16 settings.



◇ Running Current

The output current of the SRAC4/8 Step Drive is set by the SW5, SW6, SW7 and SW8 switches and can be changed as necessary. There are 8 settings available according to the ON/OFF combination of the switches



◇ Idle Current

The running current of the SRAC4/8 drive is automatically reduced whenever the motor hasn't moved for 1 second. Setting the SW9 and SW10 switch to ON reduces the current to 50% of its running value. Setting this switch to OFF maintains 90% of the running current. This 90% setting is useful when a high holding torque is required. To minimize motor and drive heating it is highly recommended that the idle current reduction feature be set to 50% unless the application requires the higher setting.

Idle	SW9	SW10
25%	ON	ON
50%	OFF	ON
70%	ON	OFF
90%	OFF	OFF

◇ Anti Resonance

The SW11 and SW12 switches select the load inertia. There are 4 settings. The inertia selection can help the SRAC8 drive to calculate the current control parameter. If the load inertiais close to that of the motor rotor, the low setting shouldbe selected. If the load inertia is higher than that of the rotor, a proportionally higher setting should be selected.

Option	SW11	SW12	Inertia
0	ON	ON	Low ↓ High
1	OFF	ON	
2	ON	OFF	
3	OFF	OFF	

◇ Step Input Mode

Setting SW13 to OFF enables the Step & Direction format, the ON position enables the CW/CCW format.

Note: The power must be cycled each time the position of SW13 is changed.

◇ Digital Input Filter

Switch SW14 sets the digital signal filter. Setting switch to "OFF" will select high frequency 2MHz, and setting switch to "ON" will select low frequency 150 KHz.

Note: The setting will take effect after recycle the power.

◇ Command Signal Smoothing

Command signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components. SW15 selects this function - ON enables it, OFF disables it.

This function can cause a small delay in following the control signal, and it should be used with that in mind.

Note: The setting will take effect after recycle the power

◇ Self Test

Setting switch SW16 to ON after the drive is powered up will cause the drive to perform a self test rotary the motor back and forth, two turns in each direction, setting switch SW16 to OFF will disable this feature.

■ Motor Selection

Each position of the 16-bit rotary switch selects a different motor, and automatically sets the configuration parameters in the drive. The SRAC4/8 drive comes programmed with up to 16 typical motors as factory defaults. Drives can be customized with specially selected motors when required.

Switch Bit	SRAC4			SRAC8		
	Motor	Wiring	Current Peak(A)	Motor	Wiring	Current Peak(A)
0	AM34HD0802	Series Connected	1.8	AM34HD0802	Series Connected	1.8
1		Parallel Connected	3.6		Parallel Connected	3.6
2	AM34HD1802	Series Connected	1.8	AM34HD1802	Series Connected	1.8
3		Parallel Connected	3.6		Parallel Connected	3.6
4	AM34HD2805	Series Connected	1.8	AM34HD2805	Series Connected	1.8
5		Parallel Connected	3.6		Parallel Connected	3.6
6	AM34HD4802	Series Connected	1.8	AM34HD4802	Series Connected	1.8
7		Parallel Connected	3.6		Parallel Connected	3.6
8	AM34HD6801	Series Connected	1.8	AM34HD6801	Series Connected	1.8
9		Parallel Connected	3.6		Parallel Connected	3.6
A	AM23HS2459	4 Lead Bipolar	1	43HD115	4 Lead Bipolar	6.0
B	AM23HS3466	4 Lead Bipolar	1	43HD150	4 Lead Bipolar	6.0
C	AM24HS5411	4 Lead Bipolar	1	43HD165	4 Lead Bipolar	6.5
D	Reserved	-	-	51HD27	4 Lead Bipolar	7.0
E	Reserved	-	-	51HD45	4 Lead Bipolar	7.0
F	Reserved	-	4.0	StdMotor_119	-	7.0

■ LED Error Codes

Code		Error
●	Solid green	Motor disabled
● ●	Flashing green	Motor enabled
● ● ● ●	3 red, 1 green	Over temperature
● ● ● ● ●	3 red, 2 green	Bad internal voltage
● ● ● ● ●	4 red, 1 green	Over voltage
● ● ● ● ● ●	4 red, 2 green	Under voltage
● ● ● ● ● ●	5 red, 1 green	Over current/short circuit
● ● ● ● ● ● ●	5 red, 2 green	Excess Regen
● ● ● ● ● ● ●	6 red, 1 green	Open motor winding

● Show Red; ● Show Green.

AC Input Controller Type Step Motor Drive-STAC Series

STAC5 Series

The STAC5 series are compact digital stepper drives with multiple control options and many sophisticated features. Step motors run smoother and faster than ever with features of advanced current control.

With mutiple control options, STAC5 series support stand-alone programming and various bus control as RS-232/485, Ethernet UDP/TCP, CANopen and Ethernet/IP.

The STAC5 series also has optional encoder feedback with close loop for improved system performance and reliability.

The STAC5 provides enhanced high-speed characteristics compared with a DC input driver.

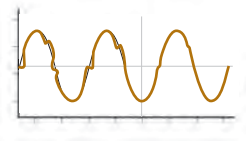
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation
- ✓ Stall Detection and Stall Prevention

Features

Anti-Resonance/Electronic Damping

Step motor systems have a natural tendency to resonate at certain speeds. The STAC5 drive automatically calculates the system's natural frequency and applies damping to the control algorithm. This greatly improves midrange stability, allows for higher speeds, greater torque utilization and also improves settling times.

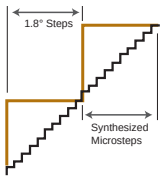
Delivers better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low-resolution step pulses and create fine resolution micro-step motion.

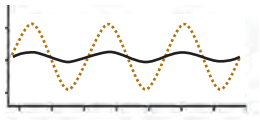
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion of the motor. By analyzing this torque ripple the system can apply a negative harmonic to negate this effect, which gives the motor much smoother motion at low speed.

Delivers smoother motion at lower speeds



Command Signal Smoothing

Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.
Improves overall system performance

Stall Detection & Stall Prevention

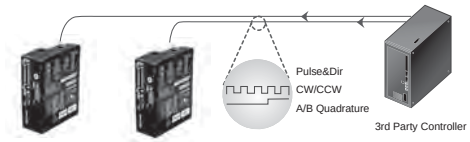
The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Self Test & Auto Setup

At start-up the drive measures motor parameters, including the resistance and inductance, then uses this information to optimize the system performance

Which model is right for your application?

Step & Direction



S

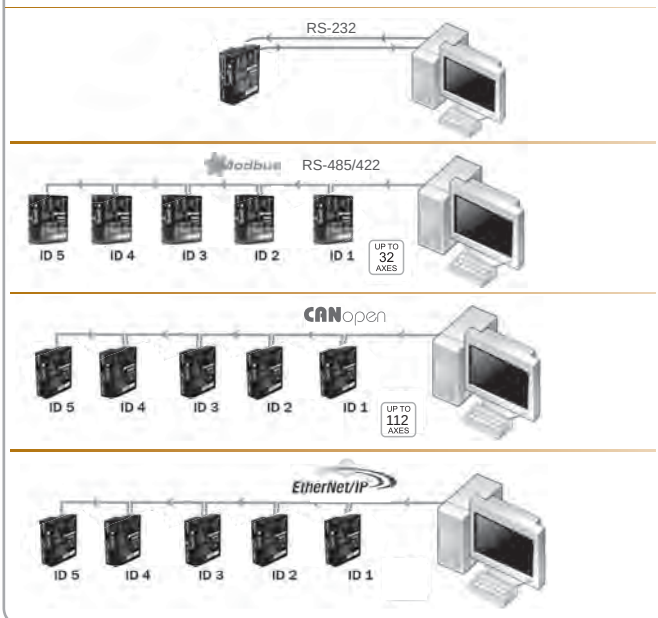
- Step & Direction
- CW & CCW pulse
- Master Encoder

Oscillator / Run-Stop

S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

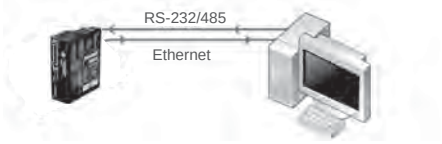
Host Control



S Q C IP

- Accepts commands from host PC or PLC
- Multi-axis capable
- Real time control

Stand Alone Programmable



Q

- Accepts commands from host PC or PLC
- Multi-axis capable
- Real time control

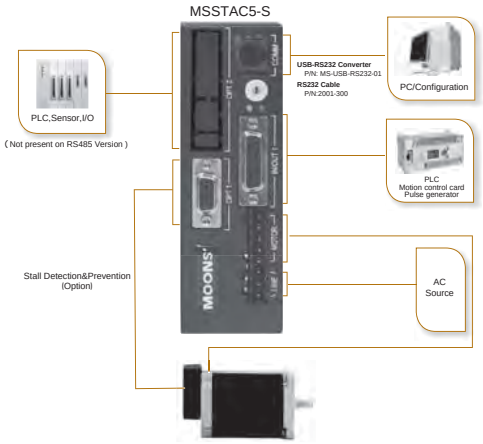
STAC Lineup with Control Modes

-S Pulse Input Control

Controlled via pulse generator.

Main Features

- Accepts three types of pulse signal input as Pulse&Direction, CW/CCW and A/B Quadrature
- Encoder signal output, A/B/Z differential

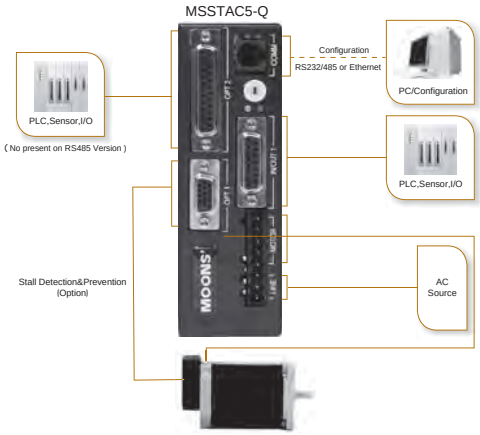


-Q Built-in programmable motion controller (Includes Modbus/RTU type)

Run stand-alone with sophisticated and functional programs. Commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

Main Features

- Stand-alone operation plus Serial host control
- Math operations
- Register manipulation
- Multi-tasking
- With all features in S type

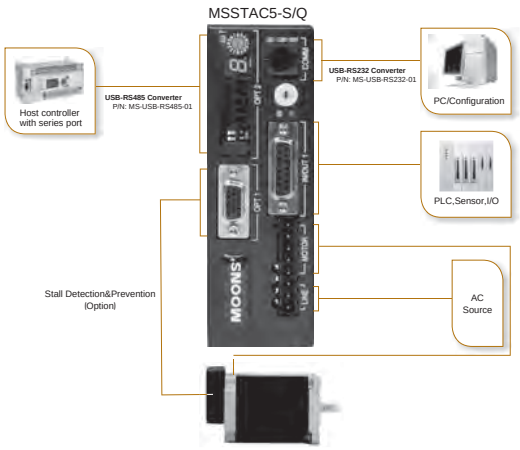


S/Q with RS-232/RS-485 communication

Controlled via pulse signals, analog signal or MOONS' SCL streaming series commands.

Main Features

- Pulse control
- Analog control
- Host real time control using SCL via RS-232/RS-485
- Up to 32 axes per channel for RS-485

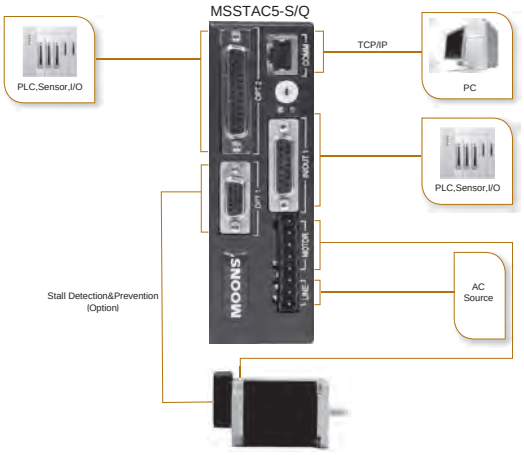


-S/Q With Ethernet communication

Controlled via MOONS' SCL streaming commands.

Main Features

- Host real time control using SCL via Ethernet UDP/TCP

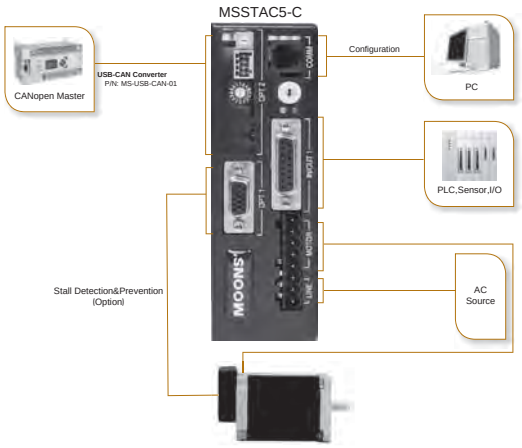


-C With CANopen communication

Operates on a CANopen communication network and conforms to CiA301 and CiA402. It supports runing stored Q programs via MOONS'-specific CANopen objects.

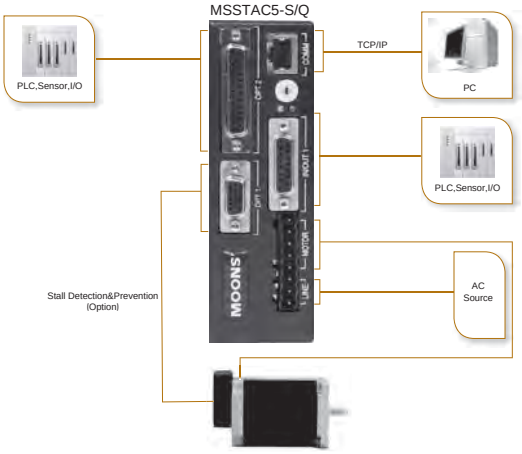
Main Features

- CANopen network
- Up to 112 axes per channel
- Objects for Q programming



-IP With EtherNet/IP communication

Communicate with PLCs and other industrial devices supporting the Ethernet/IP standard. They can also be commanded to execute stored Q programs.



Numbering System

MSSTAC 5 - S - □ E - 2V

Series

Control Mode
S = Basic Type
Q = Q Program Type
(Modbus/RTU Type)
C = CANopen Type
IP = EtherNet/IP Type

Communication
A = RS-232
R = RS-485 (Blank for CANopen or Ethernet)

Feedback
N = None
E = Encoder

Input Voltage
2V = 220VAC

Ordering Information

Model	Control	Current	Voltage	Encoder	RS-232	RS-485	Modbus/RTU	CANopen	Ethernet	EtherNet/IP	Expanded I/O
MSSTAC5-S-AN-2V	S	0.5-2.55A	94-265VAC		√						
MSSTAC5-S-AE-2V				√	√						
MSSTAC5-S-RN-2V						√					
MSSTAC5-S-RE-2V				√		√					
MSSTAC5-S-N-2V									√		
MSSTAC5-S-E-2V				√					√		
MSSTAC5-Q-AN-2V	Q				√						√
MSSTAC5-Q-AE-2V				√	√						√
MSSTAC5-Q-RN-2V						√	√				
MSSTAC5-Q-RE-2V				√		√	√				
MSSTAC5-Q-N-2V									√		√
MSSTAC5-Q-E-2V				√					√		√
MSSTAC5-C-N-2V	C				√			√			
MSSTAC5-C-E-2V				√	√			√			
MSSTAC5-IP-N-2V	IP								√	√	√
MSSTAC5-IP-E-2V				√					√	√	√

Drive Specifications

Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 16 KHz
Output Current	0.5-2.55A/Phase(peak of sine) in increments of 0.01A
Input Voltage	Signal Phase 94-265VAC
Protection	Over-voltage, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)
Regeneration	Built-in regeneration circuit, 10 watts max.
Idle Current	Automatic idle current reduction to reduce heat after motor stops moving, software selectable current and idle delay
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Microstep Emulation	Switch selectable microstep emulation provides smoother, more reliable motion
Anti-Resonance	Raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor, dip switch selectable load inertia
Torque Ripple Smoothing	Allows for fine adjustment of phase current waveform harmonic content to reduce low-speed torque ripple in the range of 0.25 to 1.5 rps
Encoder Feedback	Optional encoder feedback for stall detection and stall prevention
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Humidity	90% non-condensing
Ambient Temperature	0 - 40°C when mounted to a suitable heat sink
Mass	Approx. 0.68Kg

I/O Specifications

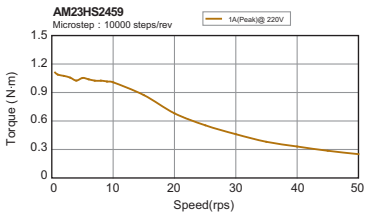
All models	X1, X2 inputs: Optically isolated, differential, 5-24 VDC, minimum pulse width = 250 ns, maximum pulse frequency = 2 MHz X3, X4 inputs: Optically isolated, differential, 5-24 VDC Y1, Y2 outputs: Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max Analog input: Single-ended. Range is software selectable 0-5, +/-5, 0-10, or +/-10 VDC. Software configurable offset, deadband and filtering. Resolution is 12 bits (+/- 10 volt range), 11 bits (+/-5 or 1-10 volt range) or 10 bits (0-5 volt range).
Expanded I/O	-Q-A models have the same I/O as above plus the following: IN1, IN2, IN7, IN8 inputs: Optically isolated, differential, 5-24 VDC logic (2.5V switching threshold), 100 usec minimum pulse width, maximum current = 10 mA. IN3-IN6 inputs: Optically isolated, single-ended, shared common. sinking or sourcing, 12-24 VDC logic, 2200 ohms, maximum current = 10 mA. OUT1-OUT3 outputs: Optical darlington, single-ended, shared , sinking, 30VDC max, 100 mA max, voltage drop = 1.2V max at 100 mA. OUT4 output: Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max, voltage drop = 1.2V max at 100 mA.

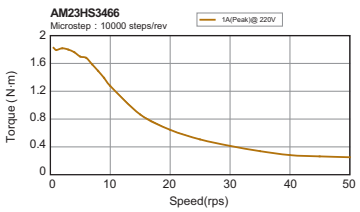
Recommended Motors

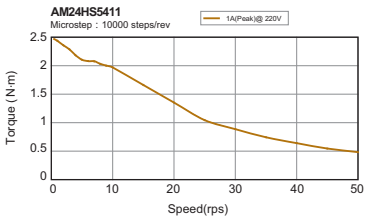
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm^2	Kg	
AM23HS2459-01	Single Shaft	A	4	54	1.1	1	16.6	260	0.6	1500VAC 1 minute
AM23HS3466-01	Single Shaft			76	1.8		25.4	460	1.0	
AM24HS5411-01N	Single Shaft			85	2.5		15.4	900	1.4	
AM34HD0802-01	Single Shaft	C	8	66.5	3	1.8	3.4	1100	1.6	
AM34HD0802-02	Double Shaft									
AM34HD0802-E1000D	Include Encoder									
AM34HD4802-01	Single Shaft			75	3.5		3.6	1350	1.9	
AM34HD1802-01	Single Shaft			96	5		3.6	1850	2.7	
AM34HD1802-03	Double Shaft									
AM34HD1802-E1000D	Include Encoder									
AM34HD6801-01	Single Shaft			115	6.5		4	2400	3.5	
AM34HD2805-01	Single Shaft			125.5	7.1		4.2	2750	3.8	
AM34HD2805-03	Double Shaft									
AM34HD2805-E1000D	Include Encoder									

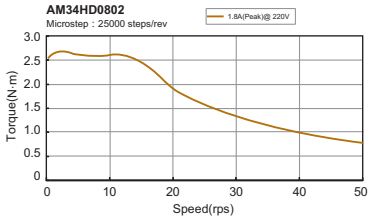
* Wiring Diagram A, C See Page 195

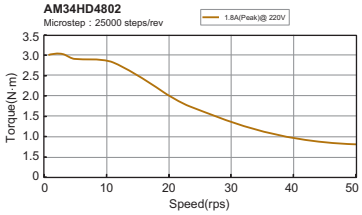
MSSTAC5 Torque Curves

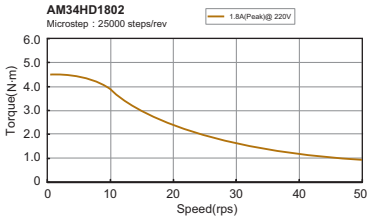


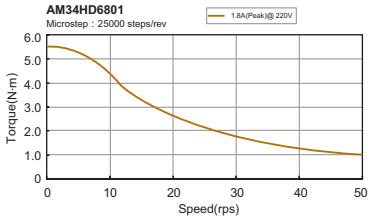


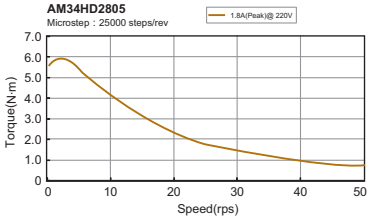




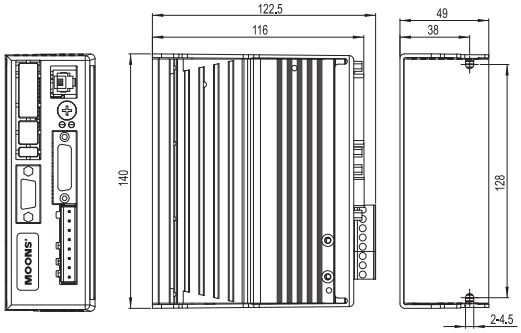






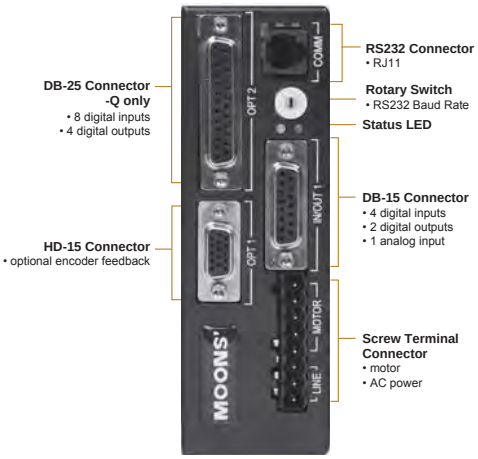


Dimensions(Unit:mm)



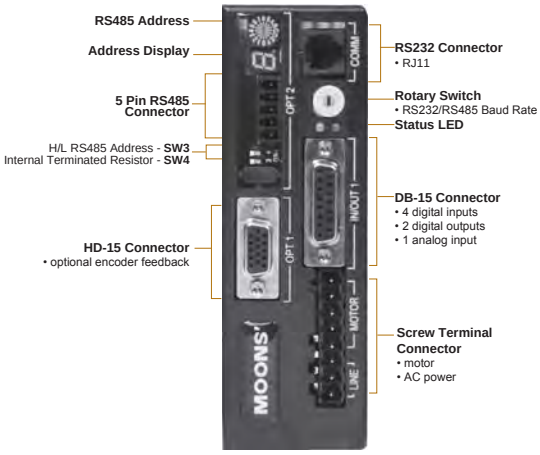
Connection and Operation

RS232



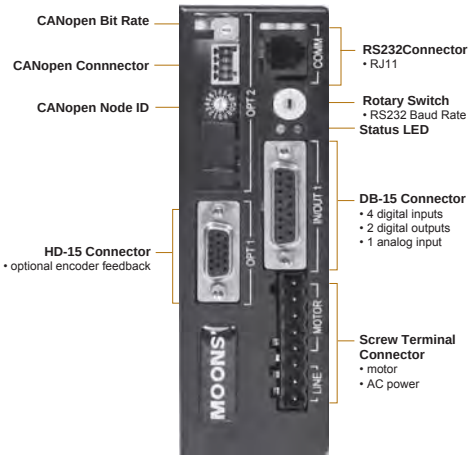
RS232 Version

RS485



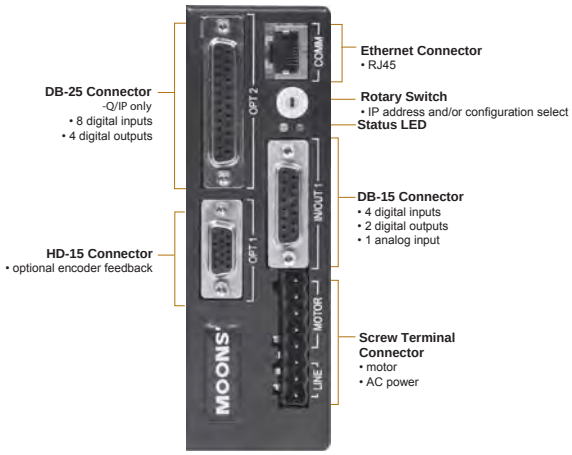
RS485 Version

CANopen



CANopen Version

Ethernet



Ethernet Version

Connecting the Power Supply

Use the supplied connector to connect to the AC supply according to the diagram below. Use 16 AWG wire for Line (L) and Neutral (N). Use 14 AWG for Earth Ground (G).

Care should always be taken when working with high voltages.

In regions where the single-phase supply is higher, an auto transformer can be used to drop the voltage to the correct level.

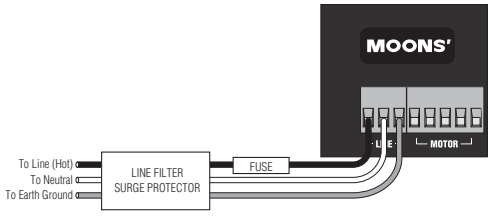
The STAC5 contains an internal 6.3A fast acting fuse. If an external fuse is desired, we recommend a 6 amp fast acting fuse.

For applications requiring CE EMC compliance, a line filter is required in series with the AC input.

Mating Connector P/N: Weidmuller 1526510000

Line Filter

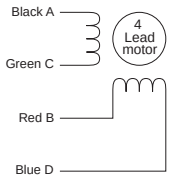
For applications requiring CE EMC compliance,
a Tyco Electronics Corcom 6ET1 line filter is required
in series with the AC input.



Connecting the Motor

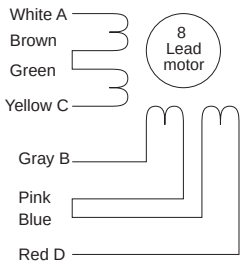
Mating Connector P/N: Weidmuller 1526710000

Four lead motors can only be connected one way.



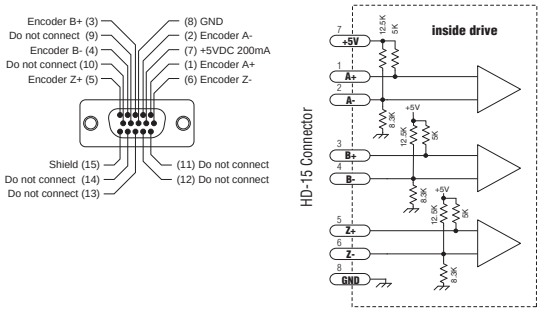
4 Lead Motor

Eight lead motors are recommended to be connected in series connection.



8 Lead Motor

Connecting an Encoder



MSSTAC5 drives are available with optional encoder feedback for closed loop and provide following features:

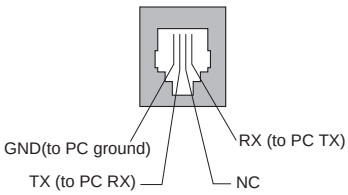
- Stall Detection: Detects the moment the motor has stalled and triggers a drive fault.
- Position Maintenance: maintains shaft position when the motor is stopped.
- Stall Prevention: automatically senses rotor lag and avoid stalling.

Mating Connector
DB-15 male P/N: OUPIIN 7917-15MTBC00A

Shell Kit P/N: OUPIIN DP-09CP

Communication Interface

◇ Connecting to the Host using RS-232



Connector RJ11

Baud Rate set by rotary switch

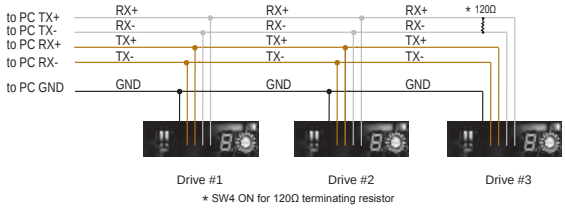
0	9600
1	19200
2	38400
3	57600
4	115200
5-F	9600

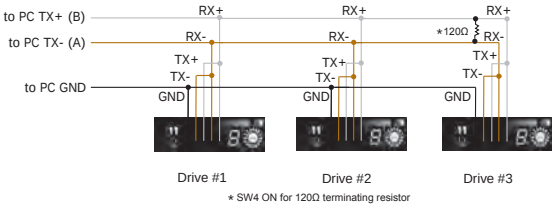
◇ Connecting to a Host using RS-485

SW4	Terminal Resistor Setting
	ON: Enable
	OFF: Disable

Mating Connector

P/N: Weidmuller 1792800000





RS485 Address Setting

Address is set by the combination of Rotary switch and Dip switch SW3

SW3	RS-485 Address Setting
ON	00—0F
OFF	10--1F

RS485 Address Display

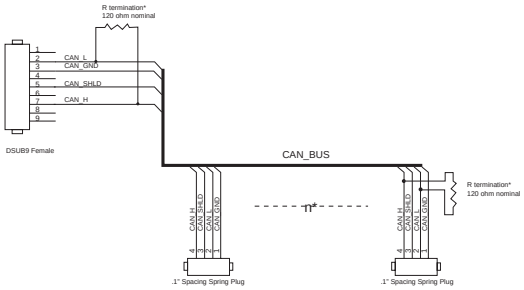
Rotary Switch	Dip Switch SW3	LED Display	RS485 Adress (in SCL Utility)
0		0	0
1		1	1
2		2	2
3		3	3
4		4	4
5		5	5
6		6	6
7		7	7
8		8	8
9		9	9
A		A	:
B		b	;
C		C	<
D		d	=
E		E	>
F		F	?

Rotary Switch	Dip Switch SW3	LED Display	RS485 Adress (in SCL Utility)
0		0.	@
1		1.	!
2		2.	“
3		3.	#
4		4.	$
5		5.	%
6		6.	&
7		7.	‘
8		8.	(
9		9.	)
A		A.	*
B		b.	+
C		C.	,
D		d.	-
E		E.	.
F		F.	/

Baud Rate set by rotary switch

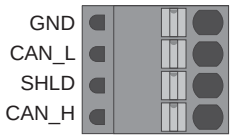
0	9600
1	19200
2	38400
3	57600
4	115200
5-F	9600

◇ Connecting to CANopen network



R termination:
Network must be terminated at each end with a 120 ohm resistor.

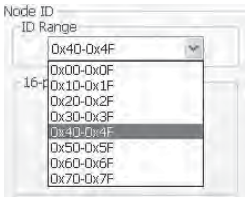
n:
Cable may be made with up to 112 drive connectors. Termination is only required at each end.



Mating Connector
Phoenix P/N:1881341

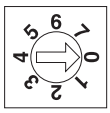
Node ID

Each node ID on a CANopen network must have a unique Node ID. The Node ID is configured using a sixteen position switch SW2 to set the lower four bits of the Node ID while the upper three bits are configured by using ST Configurator. CANopen Node IDs are seven bits long, with a range of 1 - 112, or 0x01 - 0x7F in hexadecimal notation. Node ID 0x00 is reserved in accordance with the CiA 301 specification.



Setting the Bit Rate

The CANopen network bitrate is set by the ten position switch SW1 on the front of the drive. The bit rate must be the same for all nodes on the CANopen network. Any changes to the bit rate require either a power cycle or a CANopen reset command to take effect.



Switch Setting	Resultant Bit Rate
0	1 Mbps
1	800 kbps
2	500 kbps
3	250 kbps
4	125 kbps
5	50 kbps
6	20 kbps
7	12.5 kbps

◇ Connecting to PC using Ethernet

Mating Connector RJ45

Addresses, Subnets, and Ports

Every device on an Ethernet network must have a unique IP address. In order for two devices to communicate with each other, they must both be connected to the network and they must have IP addresses that are on the same subnet. A subnet is a logical division of a larger network. Members of one subnet are generally not able to communicate with members of another unless they are connected through special network equipment (e.g. router). Subnets are defined by the choices of IP addresses and subnet masks.

If you want to know the IP address and subnet mask of your PC, select Start…All Programs…Accessories…Command Prompt. Then type “ipconfig” and press Enter. You should see something like

```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\moons>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 192.168.0.22
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 192.168.0.254
```

If your PC's subnet mask is set to 255.255.255.0, a common setting known as a Class C subnet mask, then your machine can only talk to another network device whose IP address matches yours in the first three octets. (The numbers between the dots in an IP address are called octets.) For example, if your PC is on a Class C subnet and has an IP address of 192.168.0.20, it can talk to a device at 192.168.0.40, but not one at 192.168.1.40. If you change your subnet mask to 255.255.0.0 (Class B) you can talk to any device whose first two octets match yours. Be sure to ask your system administrator before doing this. You network may be segmented for a reason.

IP Address*	
0	10.10.10.10
1	192.168.1.10
2	192.168.1.20
3	192.168.1.30
4	192.168.0.40
5	192.168.0.50
6	192.168.0.60
7	192.168.0.70
8	192.168.0.80
9	192.168.0.90
A	192.168.0.100
B	192.168.0.110
C	192.168.0.120
D	192.168.0.130
E	192.168.0.140
F	DHCP

Your drive includes a 16 position rotary switch for setting its IP address. The factory default ddress for each switch setting is shown in the table to the right.

Settings 1 through E can be changed using the ST Configurator software (use ST Configurator for MSSSTAC5 drives). Setting 0 is always "10.10.10.10", the universal recovery address. If someone were to change the other settings and not write it down or tell anyone then you will not be able to communicate with your drive. The only way to "recover" it is to use the universal recovery address.

Setting F is "DHCP", which commands the drive to get an IP address from a DHCP server on the network. The IP address automatically assigned by the DHCP server may be "dynamic" or "static" depending on how the administrator has configured DHCP. The DHCP setting is reserved for advanced users.

Your PC, or any other device that you use to communicate with the drive, will also have a unique address.

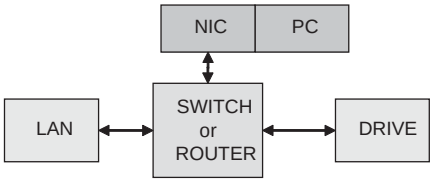
On the drive, switch settings 1 through E use the standard class B subnet mask (i.e. "255.255.0.0"). The mask for the universal recovery address is the standard class A (i.e. "255.0.0.0"). One of the great features of Ethernet is the ability for many applications to share the network at the same time. Ports are used to direct traffic to the right application once it gets to the right IP address. The UDP eSCL port in our drives is 7775. To send and receive commands using TCP, use port number 7776. You'll need to know this when you begin to write your own application. You will also need to choose an open (unused) port number for your application. Our drive doesn't care what that is; when the first command is sent to the drive, the drive will make note of the IP address and port number from which it originated and direct any responses there. The drive will also refuse any traffic from other IP addresses that is headed for the eSCL port. The first application to talk to a drive "owns" the drive. This lock is only reset when the drive powers down.

If you need help choosing a port number for your application, you can find a list of commonly used port numbers at http://www.iana.org/assignments/port-numbers.

One final note: Ethernet communication can use one or both of two "transport protocols": UDP and TCP. eSCL commands can be sent and received using either protocol. UDP is simpler and more efficient than TCP, but TCP is more reliable on large or very busy networks where UDP packets might occasionally be dropped.

Option 1: Connect a Drive to Your Local Area Network

If you have a spare port on a switch or router and if you are able to set your drive to an IP address that is compatible with your network, and not used by anything else, this is a simple way to get connected. This technique also allows you to connect multiple drives to your PC. If you are on a corporate network, please check with your system administrator before connecting anything new to the network. He or she should be able assign you a suitable address and help you get going.



If you are not sure which addresses are already used on your network, you can find out using "Angry IP scanner", which can be downloaded free from http://www.angryip.org/w/Download. But be careful: an address might appear to be unused because a computer or other device is currently turned off. And many networks use dynamic addressing where a DHCP server assigns addresses "on demand".The address you choose for your drive might get assigned to something else by the DHCP server at another time.

Once you've chosen an appropriate IP address for your drive, set the rotary switch according the address table above. If none of the default addresses are acceptable for your network, you can enter a new table of IP addresses using Confi gurator. If your network uses addresses starting with 192.168.0, the most common subnet, you will want to choose an address from switch settings 4 through E. Another common subnet is 192.168.1. If your network uses addresses in this range, the compatible default selections are 1, 2 and 3. If your PC address is not in one of the above private subnets, you will have to change your subnet mask to 255.255.0.0 in order to talk to your drive. To change your subnet mask:

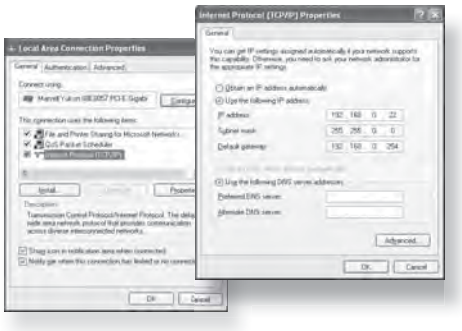
1. On Windows XP, right click on "My Network Places" and select properties. On Windows 7, click Computer. Scroll down the left pane until you see "Network". Right click and select properties. Select "Change adapter settings"

2. You should see an icon for your network interface card (NIC). Right click and select properties.

3. Scroll down until you see "Internet Properties (TCP/IP)". Select this item and click the Properties button. On Windows 7 and Vista, look for "(TCP/IPv4)"

4. If the option "Obtain an IP address automatically" is selected, your PC is getting an IP address and a subnet mask from the DHCP server. Please cancel this dialog and proceed to the next section "Using DHCP".

5. If the option "Use the following IP address" is selected, life is good. Change the subnet mask to "255.255.0.0" and click OK.



Using DCHP

If you want to use your drive on a network that where all or most of the devices use dynamic IP addresses supplied by a DHCP server, set the rotary switch to “F”. When the drive is connected to the network and powered on, it will obtain an IP address and a subnet mask from the server that is compatible with your PC. The only catch is that you won’t know what address the server assigns to your drive. Ethernet Configurator can find your drive using the Drive Discovery feature, as long as your network isn’t too large. With the drive connected to the network and powered on, select Drive Discovery from the Drive menu.

You will see a dialog such as this:

Normally, Drive Discovery will only detect one network interface card (NIC), and will select it automatically. If you are using a laptop and have both wireless and wired network connections, a second NIC may appear. Please select the NIC that you use to connect to the network to which you’ve connected your drive. Then click OK. Drive Discovery will notify you as soon as it has detected a drive.

If you think this is the correct drive, click Yes. If you’re not sure, click Not Sure and Drive Discovery will look for additional drives on you network. Once you’ve told Drive Discovery which drive is yours, it will automatically enter that drive’s IP address in the IP address text box so that you are ready to communicate.

Option 2: Connect a Drive Directly to Your PC

It doesn’t get much simpler than this:

1. Connect one end of a CAT5 Ethernet cable into the LAN card (NIC) on your PC and the other into the drive. You don’t need a special “crossover cable”; the drive will automatically detect the direct connection and make the necessary physical layer changes.

2. Set the IP address on the drive to “10.10.10.10” by setting the rotary switch at “0”.

3. To set the IP address of your PC:

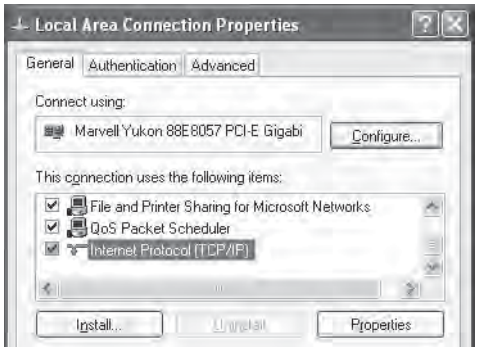
   a. On Windows XP, right click on “My Network Places” and select properties.

   b. On Windows 7, click Computer. Scroll down the left pane until you see “Network”. Right click and select properties. Select “Change adapter settings”

4. You should see an icon for your network interface card (NIC). Right click and select properties.

   a. Scroll down until you see “Internet Properties (TCP/IP)”. Select this item and click the Properties button.

   b. On Windows 7 and Vista, look for “(TCP/IPv4)”



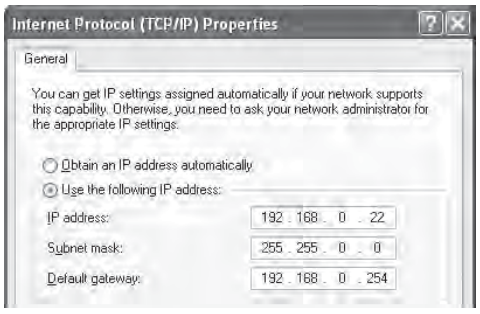
5. Select the option “Use the following IP address”. Then enter the address “10.10.10.11”. This will give your PC an IP address that is

on the same subnet as the drive. Windows will know to direct any traffic intended for the drive’s IP address to this interface card.

6. Next, enter the subnet mask as “255.255.255.0”.

7. Be sure to leave “Default gateway” blank. This will prevent your PC from looking for a router on this subnet.

8. Because you are connected directly to the drive, anytime the drive is not powered on your PC will annoy you with a small message bubble in the corner of your screen saying “The network cable is unplugged.”



Option 3: Use Two Network Interface Cards (NICs)

This technique allows you to keep your PC connected to your LAN, but keeps the drive off the LAN, preventing possible IP conflicts or excessive traffic.

1. If you use a desktop PC and have a spare card slot, install a second NIC and connect it directly to the drive using a CAT5 cable. You don’t need a special “crossover cable”; the drive will automatically detect the direct connection and make the necessary physical layer changes.

2. If you use a laptop and only connect to your LAN using wireless networking, you can use the built-in RJ45 Ethernet connection as your second NIC.

3. Set the IP address on the drive to “10.10.10.10” by setting the rotary switch at “0”.

4. To set the IP address of the second NIC:

   a. On Windows XP, right click on “My Network Places” and select properties.

   b. On Windows 7, click Computer. Scroll down the left pane until you see “Network”. Right click and select properties. Select “Change adapter settings”

5. You should see an icon for your newly instated NIC. Right click again and select properties.

   a. Scroll down until you see “Internet Properties (TCP/IP)”. Select this item and click the Properties button.

   b. On Windows 7 and Vista, look for “(TCP/IPv4)”

6. Select the option “Use the following IP address”. Then enter the address “10.10.10.11”. This will give your PC an IP address that is on the same subnet as the drive. Windows will know to direct any traffic intended for the drive’s IP address to this interface card.

7. Next, enter the subnet mask as “255.255.255.0”. Be sure to leave “Default gateway” blank. This will prevent your PC from looking for a router on this subnet.

8. Because you are connected directly to the drive, anytime the drive is not powered on your PC will annoy you with a small message bubble in the corner of your screen saying “The network cable is unplugged.”

Connecting I/O(DB15 Connector)

	Type	Pin No.	Assignment	Description
IN/OUT1	Digital Input	1	X1/STEP+	Pulse Input/Step
		2	X1/STEP-	
		3	X2/DIR+	Pulse Input/ Direction
		4	X2/DIR-	
		5	X3/EN+	Enable Input
		6	X3/EN-	
		7	GND	Earth Ground
		8	+5OUT	+5V OUT
	Digital Input	9	X4+	X4 Input
		10	X4-	
	Digital Output	11	Y1/FAULT+	Fault Output
		12	Y1/FAULT-	
		13	Y2+	Y2 Digital Output
		14	Y2-	
	Analog Input	15	ANALOG IN	Analog Input

Mating Connector
DB-15 male P/N: OUPIIN 7907-15MTBC00A
Shell Kit P/N: OUPIIN DP-15CP

Connecting Expanded I/O(DB25 Connector)

	Type	Pin No.	Assignment	Description
IO/OUT2		1	N/C	N/C
		2	N/C	
		3	N/C	
	Digital Input	4	IN6	Digital Input 3-6 (Single ended)
		5	IN5	
		6	IN4	
		7	IN3	
		8	INCOM	Digital Input COM
		9	IN2-	Digital Input2 (Differential)
		10	IN2+	
		11	IN1-	Digital Input1 (Differential)
		12	IN1+	
		13	GND	Earth Ground
	Digital Output	14	OUT1+	Digital Output 1-3 (Single ended)
		15	OUT2+	
		16	OUT3+	
		17	OUTCOM	Digital Output COM
		18	+5OUT	+5V OUT
		19	GND	Earth Ground
	Digital Output	20	OUT4+	Digital Output4 (Differential)
		21	OUT4-	
	Digital Input	22	IN7+	Digital Output7 (Differential)
		23	IN7-	
		24	IN8+	Digital Output8 (Differential)
		25	IN8-	

Mating Connector
DB-25 male P/N: OUPIIN 7907-25MTBC00A
Shell Kit P/N: OUPIIN DP-25CP

I/O Functions

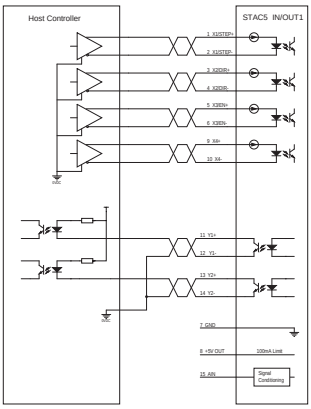
Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

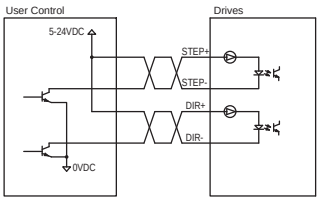
IN/OUT1 Circuit and Sample Connection

- With Line Driver Output

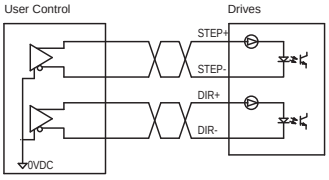


Pulse Input Mode

- With Open Collector Output



- With Line Driver Output

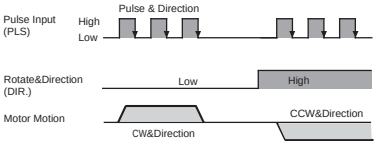


Pulse Input Mode

Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in CW direction.

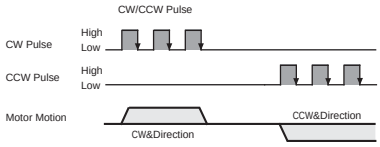
When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step in CCW direction.



CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in CW direction. When the X2 input is turned ON, the motor will rotate by one step in CCW direction.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction

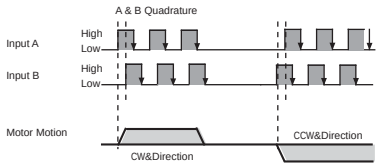


A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder.

Direction definition can be configured via ST Configurator. Direction is determined via which channel leads the other.

The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.

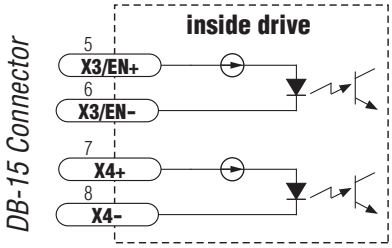


High Speed Digital Inputs

All STAC5 drives include two high speed inputs called STEP and DIR. They accept 5-24 volt single-ended or differential signals, up to 2 MHz. Normally these inputs connect to an external controller that provides step & direction command signals. You can also connect a master encoder to the high speed inputs for following applications. Or you can use these inputs with Wait Input, If Input, Feed to Sensor, Seek Home and other such commands.

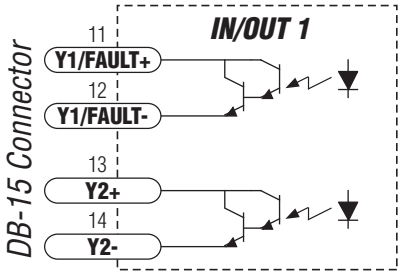
Lower Speed, Differential Digital Inputs

All STAC5 drives include two lower speed inputs called X3/EN and X4. They accept 5-24 volt single-ended or differential signals, but only at lower speeds than STEP and DIR.
You can use these inputs with Wait Input, If Input, Feed to Sensor, Seek Home and other such commands.



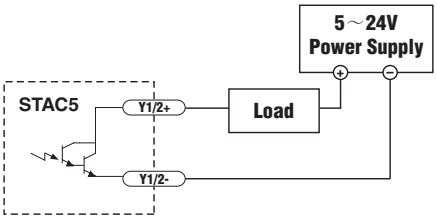
◇ Digital Outputs

The STAC5-S drives feature two digital outputs. These outputs can be set to automatically control a motor brake, to signal a fault condition, to indicate when the motor is moving or to provide an output frequency proportional to motor speed (tach signal). Or the outputs can be turned on and off by program instructions like Set Output.

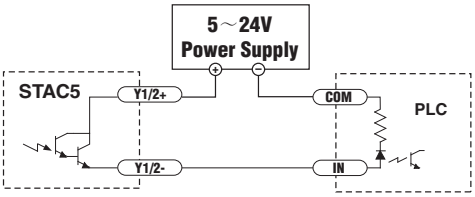


Sample Connection

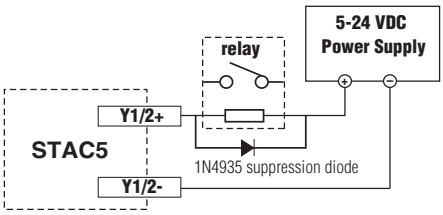
Sinking Output



Sourcing Output



Driving a Relay

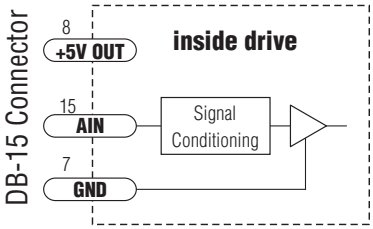


◇ Analog Input

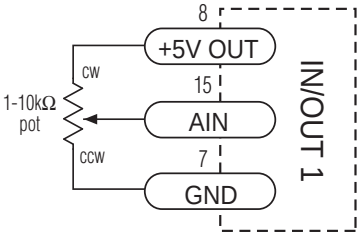
The STAC5 drives feature one analog input. It can accept a signal range of 0 to 5 VDC, ±5 VDC,

0 to 10 VDC or ±10 VDC. The drive can be configured to operate at a speed or position that is proportional to the analog signal.

Use the ST Configurator software to set the signal range, offset, deadband and filter frequency.



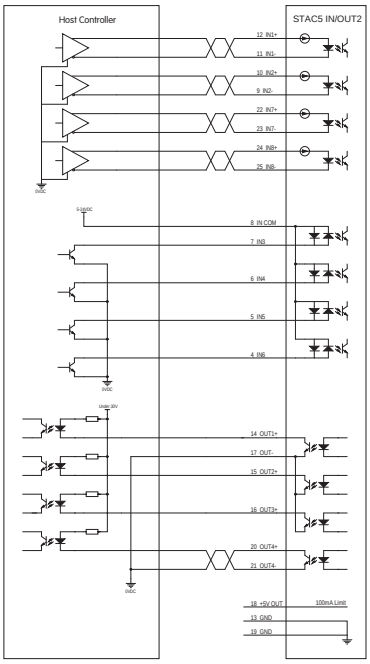
Connecting a Potentiometer



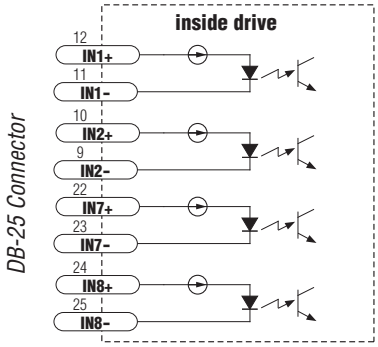
◇ IN/OUT2 Circuit and Sample Connection

Some models of drives support Expanded I/O board including additional 8 digital inputs, 4 digital outputs and 1 analog input.

- With Line Driver Output

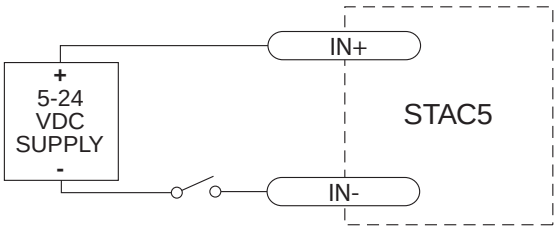


IN1,IN2,IN7,IN8 are low speed differential inputs

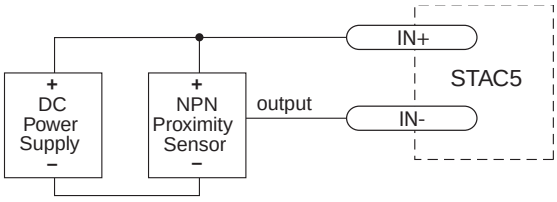


Sample connection

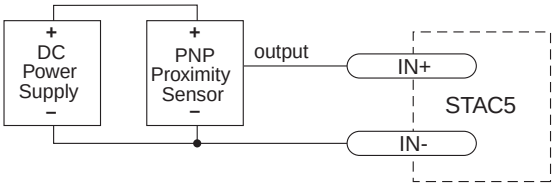
Connecting a Mechanical Switch



Connecting an NPN Proximilty Sensor

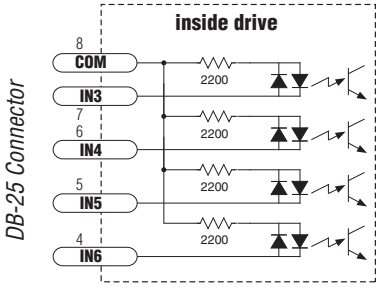


Connecting a PNP Proximilty Sensor



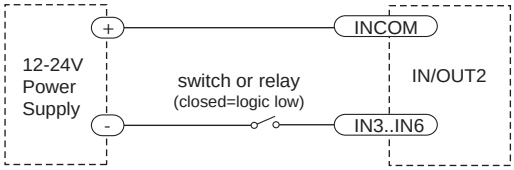
IN3,IN4,IN5,IN6 are single ended optically isolated inputs

"Common" is an electronics term for an electrical connection to a common voltage. In the case of the STAC5 drives, if you are using sourcing (PNP) input signals, then you will want to connect COM to ground (power supply -). If you are using sinking (NPN) signals, then COM must connect to power supply +.

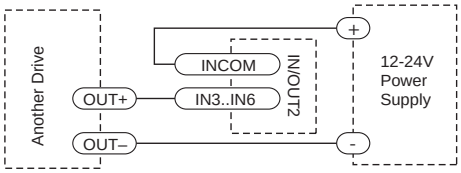


Sample Connection

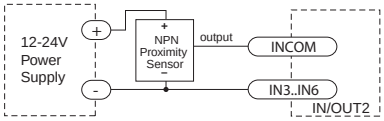
Connecting an Input to a Switch or Relay



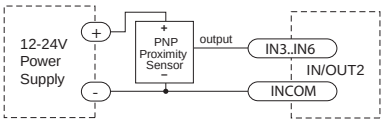
Connecting another drive



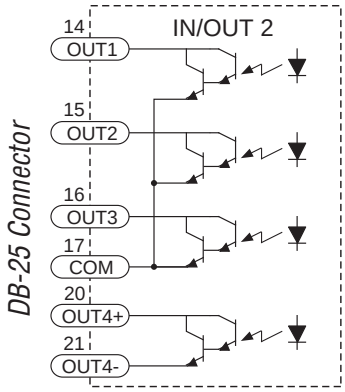
Connecting an NPN Type Proximity Sensor



Connecting a PNP Type Proximity Sensor

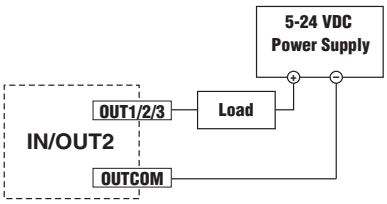


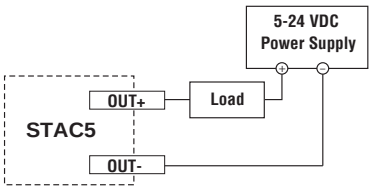
◇ Digital Outputs



Sample Connection

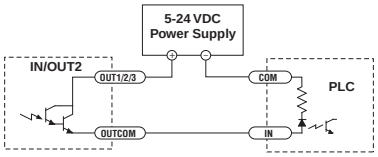
Sinking





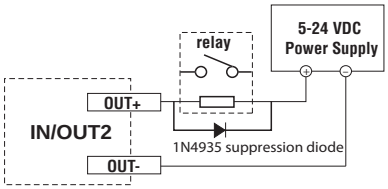
Y1, Y2, OUT4 Sinking Output

Sourcing



OUT1,OUT2,OUT3 Sourcing Output

Driving a Relay



Driving a Relay Using Y1, Y2, or OUT4

Alarm Codes

Code		Error
●	solid green	no alarm, motor disabled
○ ○	flashing green	no alarm, motor enabled
● ○	1 red, 1 green	motor stall (optional encoder only)
● ● ○	2 red, 1 green	ccw limit
● ● ○ ○	2 red, 2 green	cw limit
● ● ● ○	3 red, 1 green	drive overheating
● ● ● ○ ○	3 red, 2 green	internal voltage out of range
● ● ● ○ ○ ○	3 red, 3 green	blank Q segment
● ● ● ● ○	4 red, 1 green	power supply overvoltage or excess regen
● ● ● ● ○ ○	4 red, 2 green	power supply undervoltage
● ● ● ● ● ○	5 red, 1 green	over current / short circuit
● ● ● ● ● ● ○	6 red, 1 green	open motor winding
● ● ● ● ● ● ● ○	7 red, 1 green	communication error

● Show Red; ○ Show Green.

DC Input Stepper Drive-SR Series

SR Series Drives

The SR series are compact, powerful, digital stepper drives feature advanced microstepping performance and sophisticated current control.All drive setup is done via dip or rotary switches.

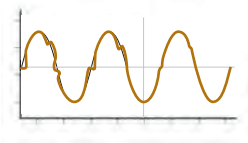
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation
- ✓ Self Test

Features

Anti-Resonance

Step motor systems have a natural tendency to resonate at certain speeds. The SR drives automatically calculate the system's natural frequency and apply damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.

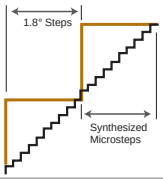
Provides better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low resolution step pulses and create fine resolution motion.

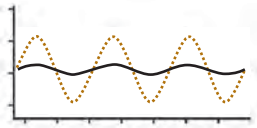
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion profile of the motor. By analyzing this torque ripple the system can apply a negative harmonic to counter this effect. This gives the motor much smoother motion at low speed.

Produces smoother motion at low speeds



Command Signal Smoothing

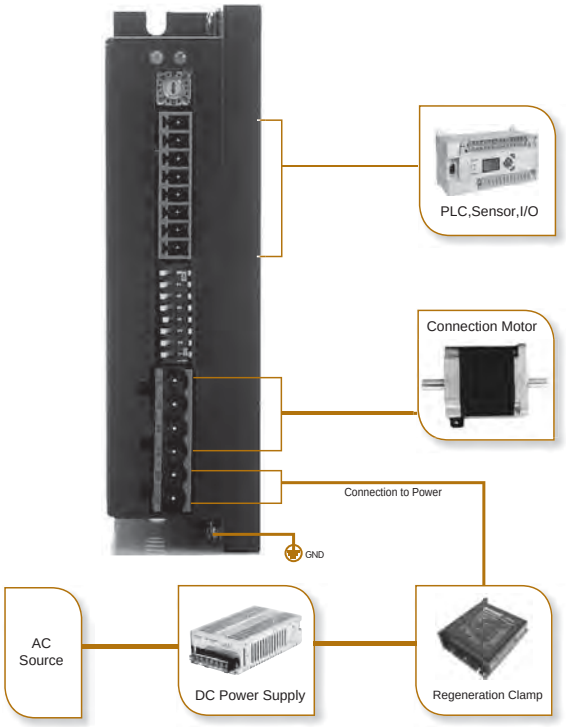
Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

Improves overall system performance

Auto Setup & Self Test

At start-up the drive measures motor parameters, including the resistance and inductance, then uses this information to optimize system performance. The drive can also detect open and short circuits.

System Configuration



Numbering System

SR - 2 - PLUS

Series

Blank=Standard
Plus=Enhanced
Mini=Compact

Max.Current
2=2.2A Max.
3=3.0A Max.
4=4.5A Max.
8=7.8A Max.

Ordering Information

Model	Current	Voltage	Microstep Selection	Current Selection
SR2-Plus	0.3—2.2A	12-48VDC	16	8
SR3-mini	0.4—3.0A	12-48VDC	16	8
SR4-Plus	1.0—4.5A	24-48VDC	16	8
SR8-Plus	2.4—7.8A	24-75VDC	16	8

Drive Specifications

Specification	
Speed Range	Up to 3000RPM
Operating Temperature	0 - 40°C
Ambient Humidity	90% or less(non-condensing)
Vibration Resistance	5.9m/s² maximum
Storage Temperature	-10 - 70°C
Heat Sinking Method	Natural cooling or fan-forced cooling
Atmosphere	Avoid dust, oily mist and corrosive air
Mass	SR2-Plus/SR3-mini: Approx. 120g
	SR4/8-Plus: Approx. 310g
Certicification	RoHS, CE (EMC): EN 61800-3:2004
Features	
Idle Current	Automatic idle current reduction to reduce heat after motor stops moving for 1 second Dip switch selectable 50% or 90%
Anti-Resonance	Raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor, dip switch selectable load inertia
Control Mode	Pulse input control Step&Dir
Inupt Signal Filter	Digital filters prevent position error from electrical noise on command signals, Dip switch selectable 2MHz or 150KHz
Microstep Emulation	Switch selectable microstep emulation provides smoother, more reliable motion
Motor Database	Rotary switch easily selects from many popular motors
Self Test	Switch selectable automatic self test, while self test, drive will rotate the motor back and forth, two turns in each direction
Fault output	Optically isolated,30VDC max, 100mA max

Electrical Specifications

SR2-Plus

Parameter	Min.	Typical	Max.	Unit
Power Supply	12	-	48	VDC
Output Current (Peak)	0.3	-	2.2	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	10	-	VDC
Over Voltage Protection	-	52	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

SR3-mini

Parameter	Min.	Typical	Max.	Unit
Power Supply	12	-	48	VDC
Output Current (Peak)	0.4	-	3	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	500k	Hz
STEP minimum pulse width	1000	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	10	-	VDC
Over Voltage Protection	-	53	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S

SR4-Plus

Parameter	Min.	Typical	Max.	Unit
Power Supply	24	-	48	VDC
Output Current (Peak)	1	-	4.5	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	20	-	VDC
Over Voltage Protection	-	60	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

SR8-Plus

Parameter	Min.	Typical	Max.	Unit
Power Supply	24	-	75	VDC
Output Current (Peak)	2.4	-	7.8	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	20	-	VDC
Over Voltage Protection	-	85	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

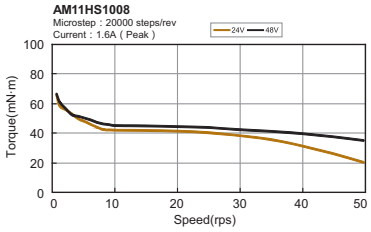
Recommended Motors

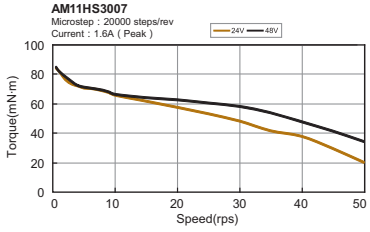
Model	Shaft	Wiring	Leads	Step Angle	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
					mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM11HS1008-07	Single Shaft	A	4	1.8°	31	0.05	1.6	2.5	9	0.1	500VAC 1 minute
AM11HS3007-02	Single Shaft				40	0.08	1.6	1.7	12	0.15	
AM11HS5008-01	Single Shaft				51	0.12	1.6	3.5	18	0.2	
AM14HYB401-03	Single Shaft				40	0.2	1	4.3	20	0.21	
AM17HD4452-02N	Single Shaft				34.3	0.25	1.8	1.5	38	0.23	
AM17HD4452-01N	Double Shaft										
AM17HD2438-02N	Single Shaft				39.8	0.4	1.8	1.9	57	0.28	
AM17HD2438-01N	Double Shaft										
AM17HD6426-06N	Single Shaft				48.3	0.5	1.8	2.3	82	0.36	
AM17HD6426-05N	Double Shaft										
AM17HDB410-01N	Single Shaft				62.8	0.85	1.6	3.2	123	0.6	
AM23HS0420-01	Single Shaft				41	0.6	2.2	1.8	135	0.42	
AM23HS0420-02	Double Shaft										
AM23HS2449-01	Single Shaft				54	1.2	2.2	2.4	260	0.6	
AM23HS2449-02	Double Shaft										
AM23HS3454-01	Single Shaft				76	1.8	2.2	2.9	460	1	
AM23HS3454-02	Double Shaft										
AM23HS04A0-01	Single Shaft				39	0.82	2.2	1.5	120	0.4	
AM23HS04A0-02	Double Shaft										
AM23HS84A0-01	Single Shaft				55	1.5	2.2	2.5	220	0.6	
AM23HS84A0-02	Double Shaft										
AM23HSA4A0-01	Single Shaft				77	2.3	2.2	3	390	1	
AM23HSA4A0-02	Double Shaft										
AM23HS0421-01	Single Shaft				41	0.6	4.5	0.48	135	0.42	
AM23HS0421-02	Double Shaft										
AM23HS2450-01	Single Shaft				54	1.2	4.5	0.63	260	0.6	
AM23HS2450-02	Double Shaft										
AM23HS3455-01	Single Shaft				76	1.8	4.5	0.75	460	1	
AM23HS3455-02	Double Shaft										
AM23HS04B0-01	Single Shaft				39	0.82	4.5	0.4	120	0.4	
AM23HS04B0-02	Double Shaft										
AM23HS84B0-01	Single Shaft				55	1.5	4.5	0.63	220	0.6	
AM23HS84B0-02	Double Shaft										
AM23HSA4B0-01	Single Shaft				77	2.3	4.5	0.8	390	1	
AM23HSA4B0-02	Double Shaft										
AM23HS5412-01	Single Shaft				111	3.2	4.5	1.2	750	1.5	
AM23HS5412-02	Double Shaft										
AM24HS2402-08N	Single Shaft				54	1.2	4.5	0.43	450	0.83	
AM24HS2402-11N	Double Shaft										
AM24HS5401-10N	Single Shaft				85	2.5	4.5	0.65	900	1.4	
AM24HS5401-24N	Double Shaft										
AM34HD0404-08	Single Shaft				66.5	3	7	0.24	1100	1.6	
AM34HD0404-09	Double Shaft										
AM34HD1404-06	Single Shaft				96	5	7	0.33	1850	2.7	
AM34HD1404-07	Double Shaft										
AM34HD2403-07	Single Shaft				125.5	7.1	7	0.49	2750	3.8	
AM34HD2403-08	Single Shaft										

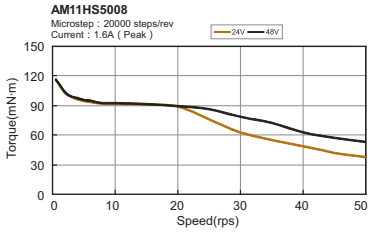
* Wiring Diagram A See Page 195

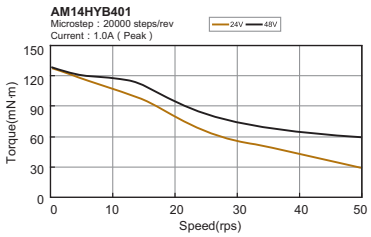
Torque Curves

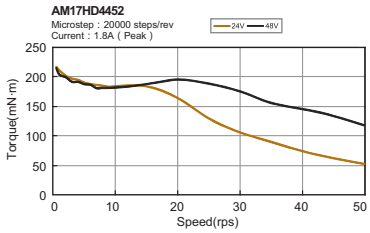
◇ SR2-Plus/SR3-mini Torque Curves

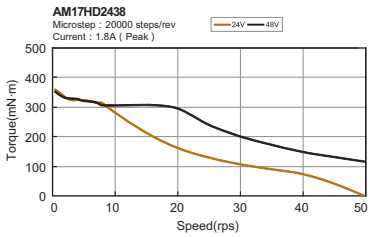


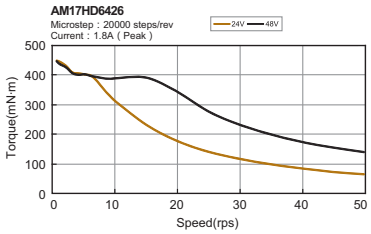


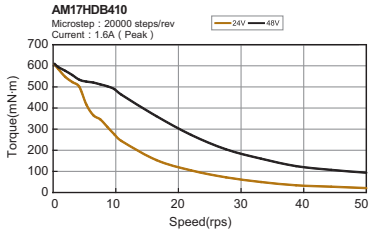


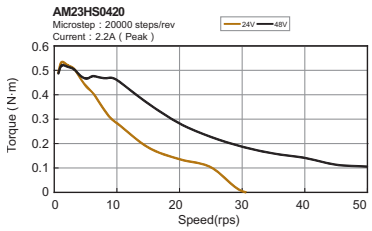


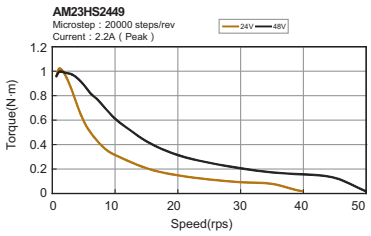


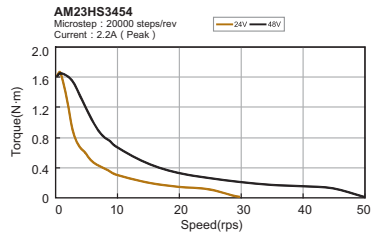




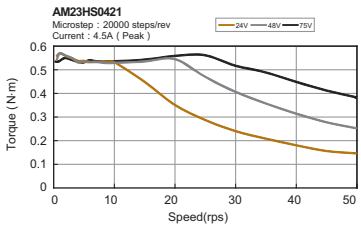


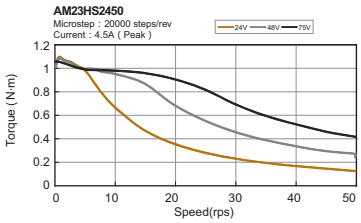


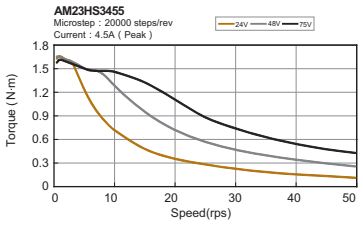


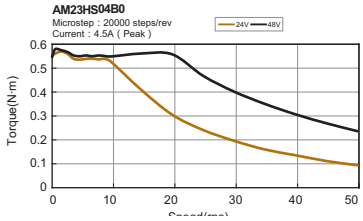


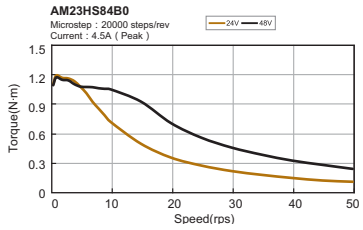
◇ SR4-Plus Torque Curves

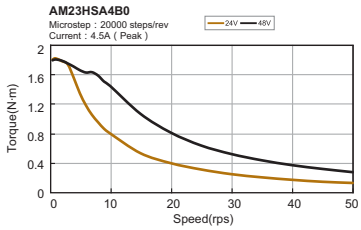


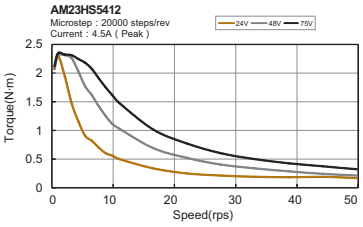


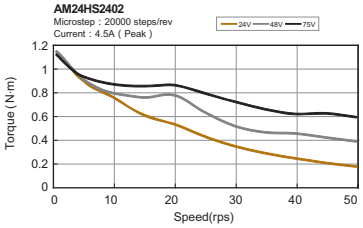


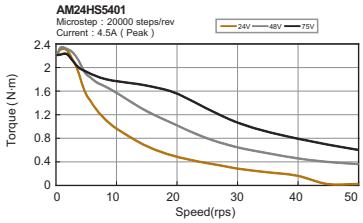




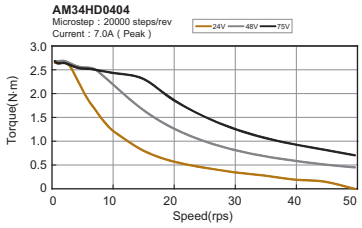


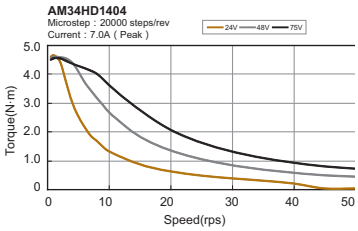


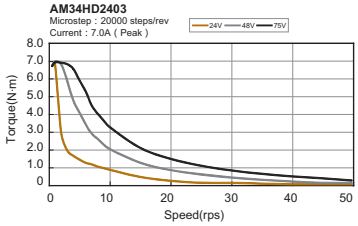




◇ SR8-Plus Torque Curves

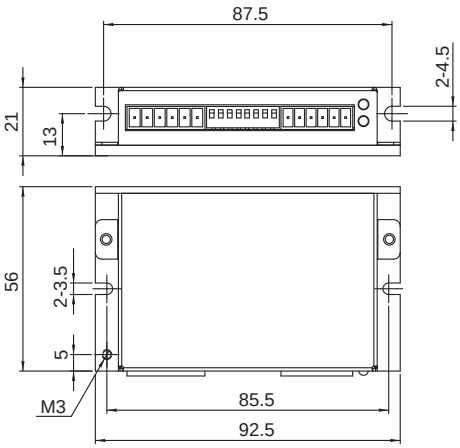






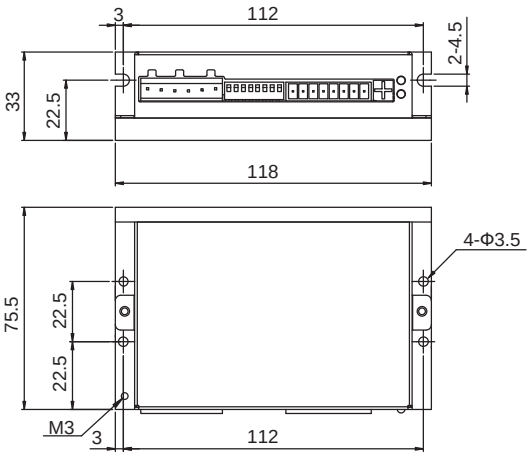
Dimensions(Unit:mm)

◇ SR2-Plus



Unit:mm

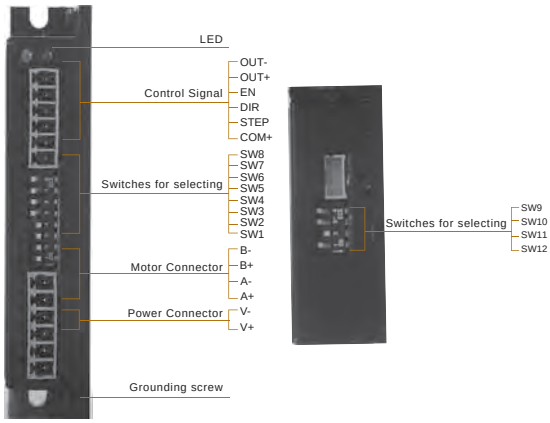
◇ SR4/8-Plus



Unit:mm

Connection and Operation(SR2-Plus)

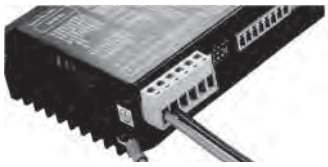
◇ Wiring Diagram



Connecting the Power Supply

If the power supply does not have a fuse on the output or some kind of short circuit current limiting device, a fast acting fuse is required. A 3 amp fast acting fuse should be installed in line with the “+” power supply lead.

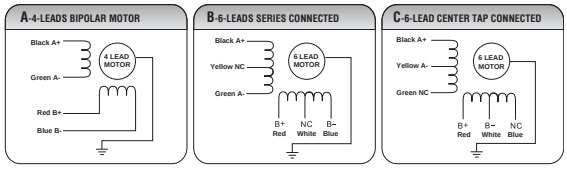
Connect the motor power supply “+” terminal to the drive terminal labeled “V+”. Connect the power supply “-” to the drive terminal labeled “V-”.



Mating Connector P/N: Phoenix 1803617, together with motor connector.

Supply Voltage: 12-48VDC

Connecting the Motor

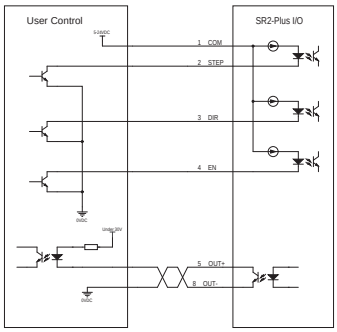


Mating Connector P/N: Phoenix 1803617, together with power connector.

◇ Digital I/0 Circuit and Sample Connection

Mating connector P/N: Phoenix 1840405

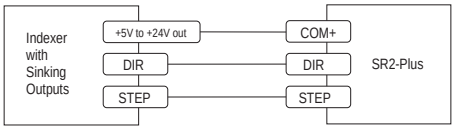
With Open Collector Output



◇ Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

- Digital singal input range 5-24VDC
- Provide safty distance between the control I/O signal lines and power lines

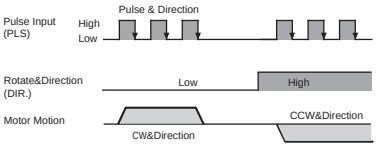


◇ Pulse Input Mode

Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in CW direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step in CCW direction.

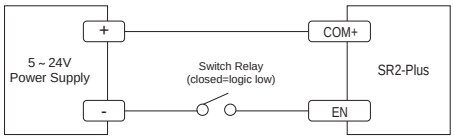


◇ EN Input

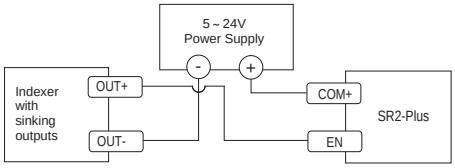
The EN input enables or disables the drive amplifier. When EN input is ON the drive amplifier is deactivated. All the MOSFETs will shut down, and the motor will be free. When EN input is OFF, the drive is activated.

A falling signal into the EN input will reset the error status and activate the drive amplifier again.

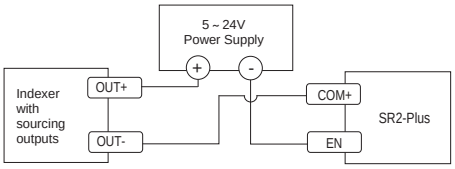
- Sample Connection



Connecting the input to a switch or relay



Connecting the input to sinking outputs



Connecting the input to sourcing outputs

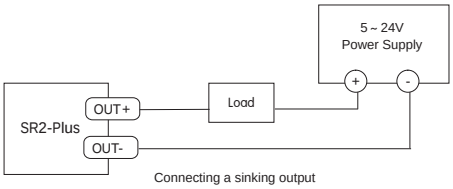
◇ Fault Output

The FAULT Output is optically isolated. The maximum collector current is 100mA, and the maximum collector to emitter voltage is 30 volts. The output can be wired to sink or source current.

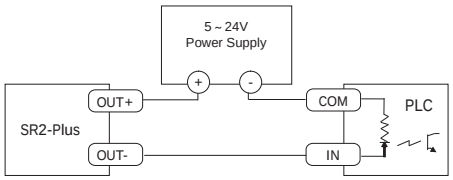
When drive is working normally, the output is open.

When the drive encounters an error, the output closes.

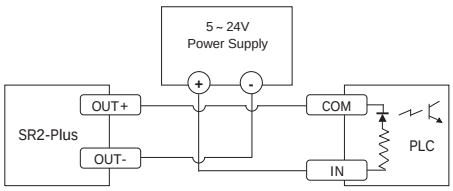
- Sample Connection



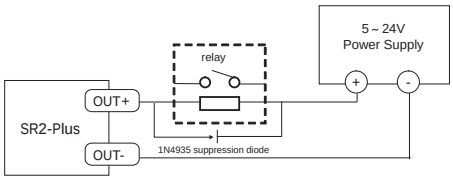
Connecting a sinking output



Connecting a souring output



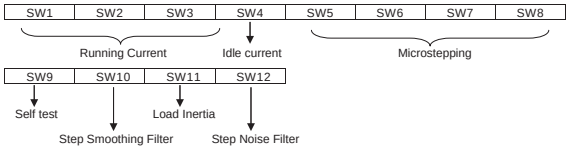
Connecting PLC souring output



Driving a relay

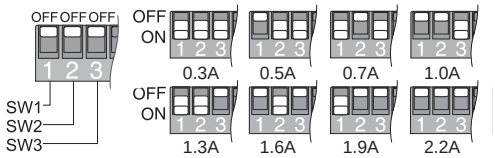
■ Switch Selecting

Many of the operational parameters of the SR2-Plus can be set or changed by position switches - either by a single switch or a combination of ON/OFF settings of 2 or more switches.



◇ Running Current

The output current of the SR2-Plus Step Drive is set by the SW1, SW2, and SW3 switches and can be changed as necessary. There are 8 settings available according to the ON/OFF combination of the switches.

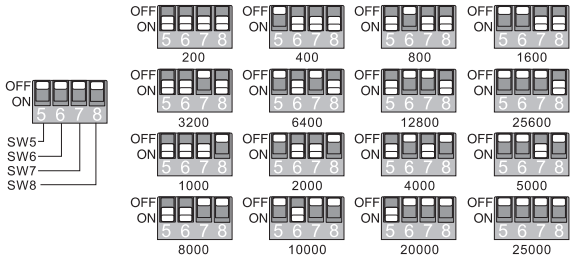


◇ Idle Current

The running current of the SR2-Plus drive is automatically reduced whenever the motor hasn't moved for 1 second. Setting the SW4 switch to ON reduces the current to 50% of its running value. Setting this switch to OFF maintains 90% of the running current. This 90% setting is useful when a high holding torque is required. To minimize motor and drive heating it is highly recommended that the idle current reduction feature be set to 50% unless the application requires the higher setting.

◇ Microstepping

The microstep resolution is set by the SW5, SW6, SW7, and SW8 switches. There are 16 settings.



◇ Self Test

Setting switch SW9 to ON after the drive is powered up will cause the drive to perform a self test rotate the motor back and forth, two turns in each direction, setting switch SW9 to OFF will disable this feature.

◇ Command Signal Smoothing

Command signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components. SW10 selects this function - ON enables it, OFF disables it.

This function can cause a small delay in following the control signal, and it should be used with that in mind.

Note: The setting will take effect after recycle the power

◇ Anti Resonance

The SW11 switches select the load inertia. SW11 ON selects low load inertia as well as SW11 OFF selects high load inertia.

◇ Digital Signal Filter

Switch SW12 sets the digital signal filter. Setting switch to "OFF" will select high frequency 2MHz, and setting switch to "ON" will select low frequency 150 KHz.

Note: The setting will take effect after recycle the power.

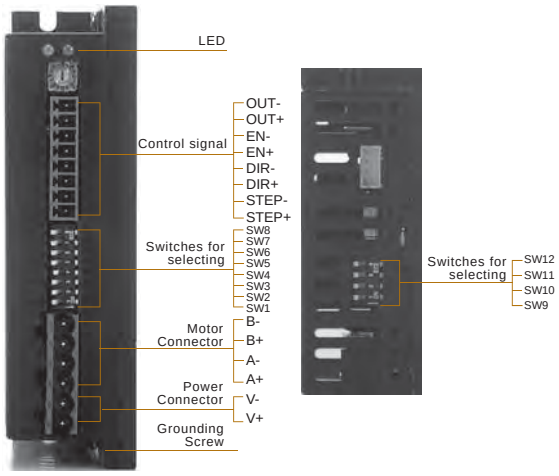
■ LED Error Codes

Code		Error
●	Solid green	Motor disabled
● ●	Flashing green	Motor enabled
●●● ●	3 red, 1 green	Over temperature
●●● ● ●	3 red, 2 green	Bad internal voltage
●●●● ●	4 red, 1 green	Over voltage
●●●● ● ●	4 red, 2 green	Under voltage
●●●●● ●	5 red, 1 green	Over current/short circuit
●●●●●● ●	6 red, 1 green	Open motor winding

● Show Red; ● Show Green.

Connection and Operation(SR4/8-Plus)

Wiring Diagram



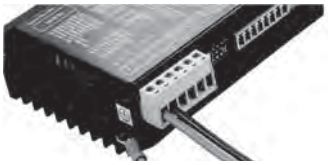
Connecting the power supply

If the power supply does not have a fuse on the output or some kind of short circuit current limiting device, a fast acting fuse is required.

Connect the motor power supply "+" terminal to the drive terminal labeled "V+". Connect the power supply "-" to the drive terminal labeled "V-".

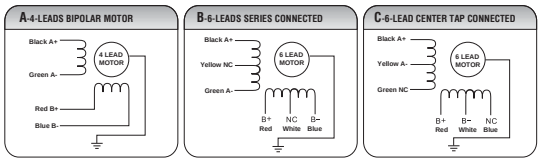
SR4-Plus Supply Voltage: 24-48VDC

SR8-Plus Supply Voltage: 24-75VDC



Mating Connector P/N: Phoenix 1757051, together with motor connector.

Connecting the motor

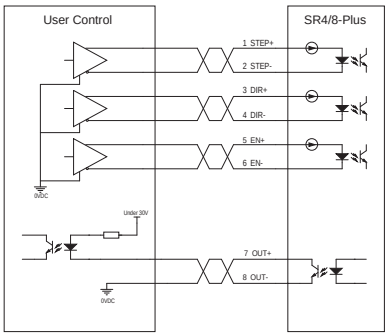


Mating Connector P/N: Phoenix 1757051, together with power connector.

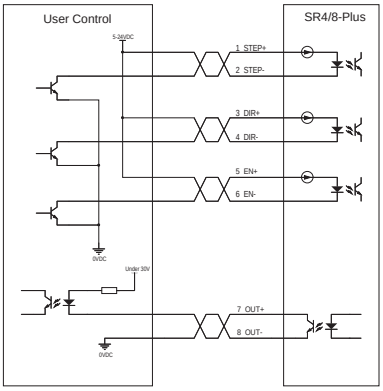
Digital I/0 Circuit and Sample Connection

Mating connector P/N: Phoenix 1803633

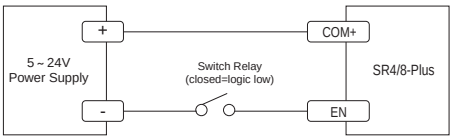
- With Line Driver Output



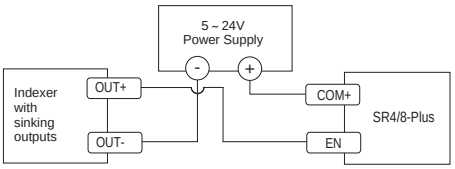
- With Open Collector Output



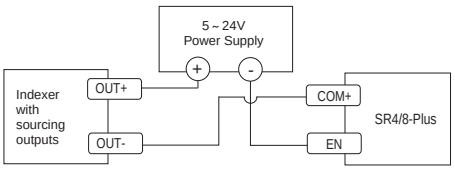
- Sample Connection



Connecting the input to a switch or relay



Connecting the input to sinking outputs



◇ Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

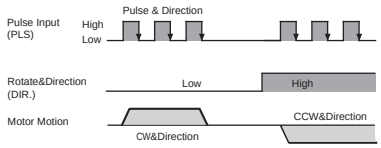
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

◇ Pulse Input Mode

Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in CW direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step in CCW direction.

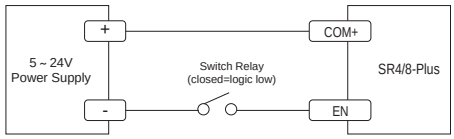


◇ EN Input

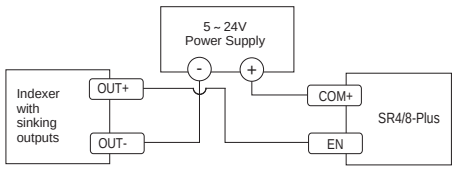
The EN input enables or disables the drive amplifier. When EN input is ON the drive amplifier is deactivated. All the MOSFETs will shut down, and the motor will be free. When EN input is OFF, the drive is activated.

A falling signal into the EN input will reset the error status and activate the drive amplifier again.

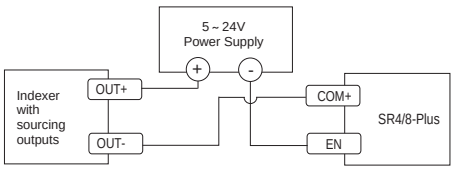
Sample Connection



Connecting the input to a switch or relay



Connecting the input to sinking outputs



Connecting the input to sourcing outputs

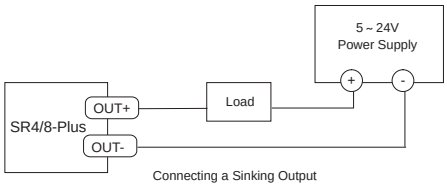
◇ Fault Output

The FAULT Output is optically isolated. The maximum collector current is 100mA, and the maximum collector to emitter voltage is 30 volts. The output can be wired to sink or source current.

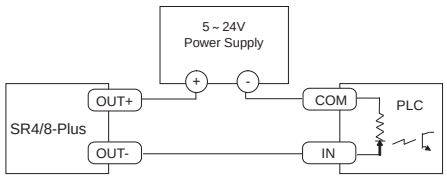
When drive is working normally, the output is open.

When the drive encounters an error, the output closes.

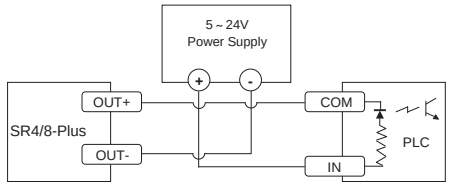
- Sample Connection



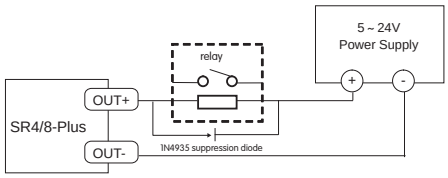
Connecting a Sinking Output



Connecting a Souring Output



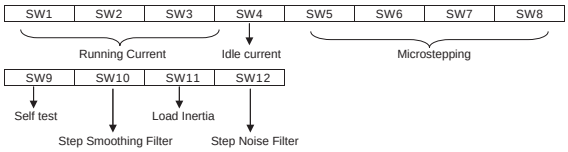
Connecting PLC Souring Output



Driving a Relay

Switch Selecting

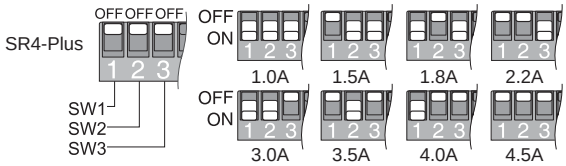
Many of the operational parameters of the SR4/8-Plus can be set or changed by position switches - either by a single switch or a combination of ON/OFF settings of 2 or more switches.

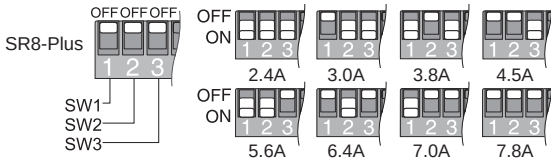


Note: The setting will take effect after recycle the power

Running Current

The output current of the SR4/8-Plus Step Drive is set by the SW1, SW2, and SW3 switches and can be changed as necessary. There are 8 settings available according to the ON/OFF combination of the switches.



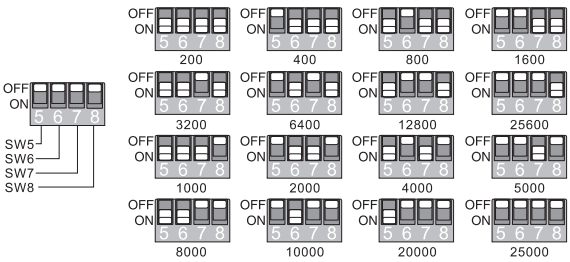


Idle Current

The running current of the SR4-Plus drive is automatically reduced anytime the motor isn't moving. Setting the SW4 switch to ON reduces the current to 50% of it running value. Setting this switch to OFF maintains 90% of the running current. This 90% setting is useful when a high holding torque is required. To minimize motor and drive heating it is highly recommended that the idle current reduction feature be set to 50% unless the application requires the higher setting.

Microstepping

The microstep resolution is set by the SW5, SW6, SW7 and SW8 switches. There are 16 settings.



Selt Test

Setting switch SW9 to ON after the drive is powered up will cause the drive to perform a self test rotage the motor back and forth, two turns in each direction.setting switch SW9 to OFF will disable this feature.

Command Signal Smoothing

Command signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components. SW10 selects this function - ON enables it, OFF disables it.

This function can cause a small delay in following the control signal, and it should be used with that in mind.

Note: The setting will take effect after recycle the powe.

Anti Resonance

The SW11 switches select the load inertia. SW11 ON selects low load inertia as well as SW11 OFF selects high load inertia.

Digital Input Filter

Switch SW12 sets the digital signal filter. Setting switch to "OFF" will select high frequency 2MHz, and setting switch to "ON" will select low frequency 150 KHz.
Note: The setting will take effect after recycle the power.

Motor Selection

Each position of the 16-bit rotary switch selects a different motor, and automatically sets the configuration parameters in the drive. The SR4/8-Plus drive comes programmed with up to 16 typical motors as factory defaults. Drives can be customized with specially selected motors when required.

Switch Bit	SR4-Plus	SR8-Plus
0	Default	Default
1	14HYB401	23HS0421
2	17HD4452	23HS2450
3	17HD2438	23HS3455
4	17HD6426	23HS5402
5	17HDB401	24HS2402
6	23HS0421	24HS5401
7	23HS2450	34HD0404
8	23HS3455	34HD1404
9	24HS2402	34HD2403
A	24HS5401	34HD4404
B	34HD0403	34HD6401
C	34HD4405	Default
D	Default	Default
E	Default	Default
F	Default	Default

Note: The setting will take effect after recycle the power.

LED Error Codes

Code		Error
●	Solid green	Motor disabled
● ●	Flashing green	Motor enabled
● ● ● ●	3 red, 1 green	Over temperature
● ● ● ● ●	3 red, 2 green	Bad internal voltage
● ● ● ● ●	4 red, 1 green	Over voltage
● ● ● ● ● ●	4 red, 2 green	Under voltage
● ● ● ● ● ●	5 red, 1 green	Over current/short circuit
● ● ● ● ● ● ●	6 red, 1green	Open motor winding

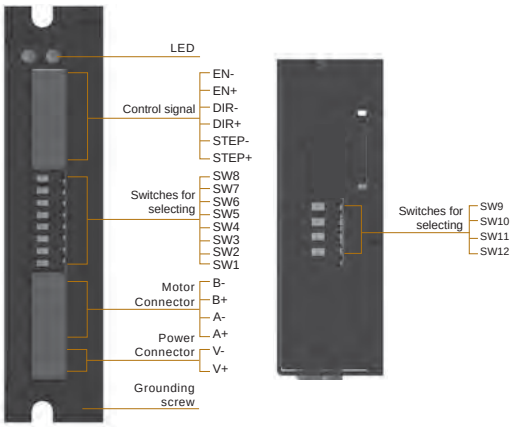
● Show Red; ● Show Green.

SR2 - 2-Phase DC Input Stepper Drive

Features

- Input Voltage: 12-48VDC
- Output Current: 2.2A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 16 different resolutions selectable via switches SW5-SW8(step/rev):
  200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000,10000, 20000, 25000
- 8 different current levels selectable via switches SW1-SW3:
  0.3A, 0.5A, 0.7A, 1.0A, 1.3A, 1.6A, 1.9A, 2.2A
- Raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor, dip switch SW11 selectable load inertia
- Digital filters prevent position error from electrical noise on command signals, Dip switch SW12 selectable 2MHz or 150KHz
- Switch SW10 selectable microstep emulation provides smoother, more reliable motion
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW4
- Self Test, selectable via Dip switch SW9
- Protection,over voltage,under voltage, over current,open motor winding

Connection Interface



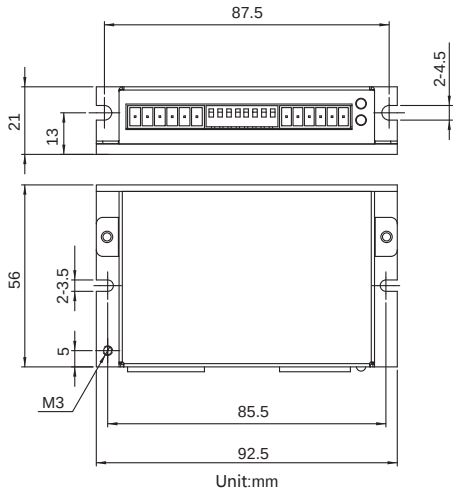
Electrical Specifications

Parameter	Min.	Type.	Max.	Unit
Power Supply	12	-	48	VDC
Output Current (Peak)	0.3	-	2.2	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	10	-	VDC
Over-voltage protection	-	52	-	VDC
Input signal voltage	4	-	28	VDC
Initialization time	-	-	2.5	S

Mass

120g

Dimensions(Unit:mm)



Ordering Information

Model	Description
SR2	Standard 0.3 - 2.2A, 12 - 48VDC

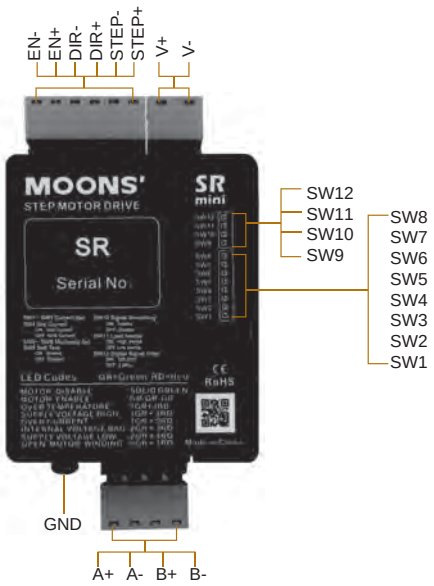
SR3-mini- 2-Phase DC Input Stepper Drive

CE RoHS

Features

- Input Voltage: 12-48VDC
- Output Current: 3.0A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 16 different resolutions selectable via switches SW5-SW8(step/rev):
  200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 6000, 8000, 10000, 20000
- 8 different current levels selectable via switches SW1-SW3:
  0.4A, 0.8A, 1.2A, 1.6A, 2.0A, 2.4A, 2.7A, 3.0A
- Setting SW11 to OFF enables the Step&Directionn format, the ON position enables the CW/CCW format
- Digital filters prevent position error from electrical noise on command signals, Dip switch SW12 selectable 500KHz or 150KHz
- Switch SW10 selectable microstep emulation provides smoother, more reliable motion
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW4
- Self Test, selectable via Dip switch SW9
- Protection,over voltage,under voltage,over temperature,over current,open motor winding

Connection Interface



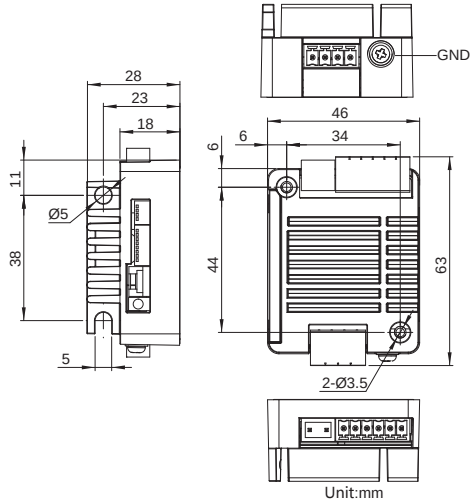
Electrical Specifications

Parameter	Min.	Type.	Max.	Unit
Power Supply	12	-	48	VDC
Output Current (Peak)	0.4	-	3	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	500K	Hz
STEP minimum pulse width	1000	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	10	-	VDC
Over Voltage Protection	-	53	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S

Mass

120g

Dimensions(Unit:mm)



Flexible Mounting Method

- Vertical

- Horizontal

- Integrated

Ordering Information

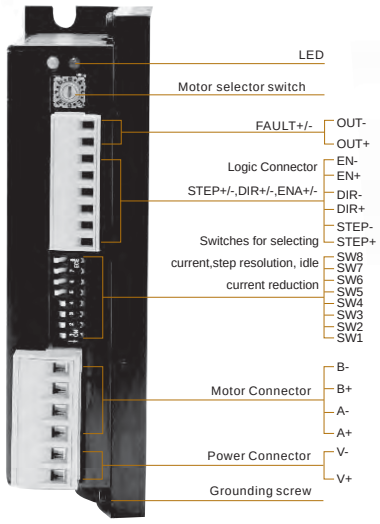
Model	Description
SR3-mini	Standard 0.4 - 3.0A, 12 - 48VDC

SR4 - 2-Phase DC Input Stepper Drive

Features

- Input Voltage: 24-48VDC
- Output Current: 4.5A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 1 Digital output: Fault Output
- 8 different resolutions selectable via switches SW5-SW7(step/rev):
  400, 800, 1600, 3200, 6400, 12800, 25600, 51200
- 8 different current levels selectable via switches SW1-SW3:
  1.0A, 1.5A, 2.0A, 2.5A, 3.0A, 3.5A, 4.0A, 4.5A
- Rotary switch selects motor and load intertia for optimized current control
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW4
- Self Test, selectable via Dip switch SW8
- Protection: over voltage,under voltage, over current,open motor winding

Connection Interface



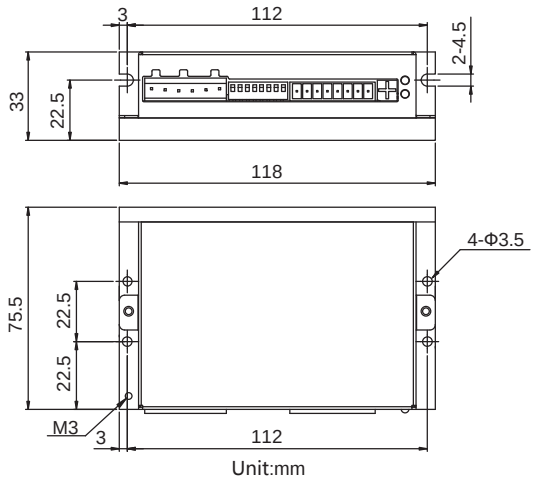
Electrical Specifications

Parameter	Min.	Type.	Max.	Unit
Power Supply	24	-	48	VDC
Output Current (Peak)	1	-	4.5	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	20	-	VDC
Over Voltage Protection	-	60	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
Output current	-	-	100	mA
Output voltage	-	-	30	VDC

Mass

0.31kg

Dimensions(Unit:mm)



Ordering Information

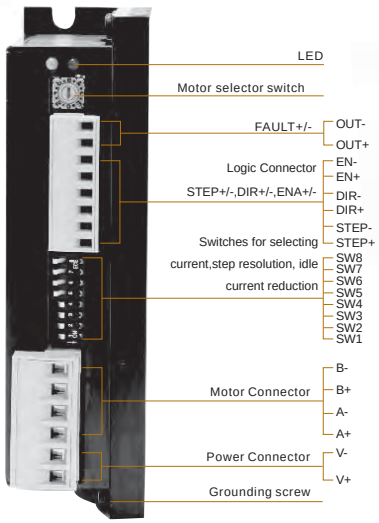
Model	Description
SR4	Standard 1.0-4.5A, 24-48VDC

SR8 - 2-Phase DC Input Stepper Drive

Features

- Input Voltage: 24-75VDC
- Output Current: 7.8A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 1 Digital output: Fault Output
- 8 different resolutions selectable via switches SW5-SW7(step/rev):
  400,800,1600,3200,6400,12800,25600,51200
- 8 different current levels selectable via switches SW1-SW3:
  2.4A, 3.2A, 4.0A, 4.8A, 5.6A, 6.4A, 7.0A, 7.8A
- Rotary switch selects motor and load intertia for optimized current control
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW4
- Self Test, selectable via Dip switch SW8
- Protection: over voltage,under voltage, over current,open motor winding

Connection Interface



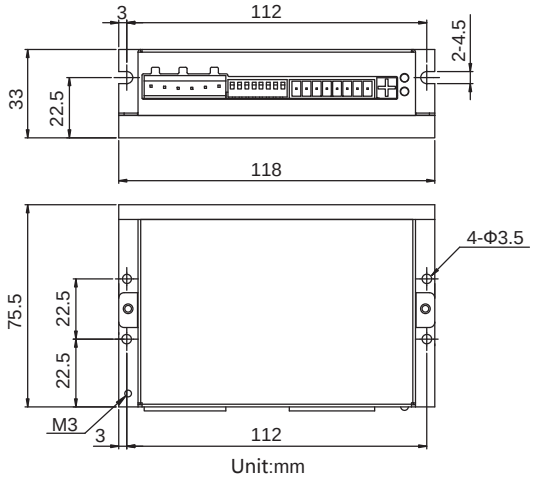
Electrical Specifications

Parameter	Min.	Type.	Max.	Unit
Power Supply	24	-	75	VDC
Output Current (Peak)	2.4	-	7.8	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	20	-	VDC
Over Voltage Protection	-	85	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

Mass

0.31kg

Dimensions(Unit:mm)



Ordering Information

Model	Description
SR8	Standard 2.4 - 7.8A, 24 - 75VDC

DC Input Controller Type Stepper Drive-ST Series

ST Series

The ST series are compact digital stepper drives with multiple control options and many sophisticated features. Step motors run smoother and faster than ever with features of advanced current control.

With mutiple control options, ST series support stand-alone programming and various bus control as RS-232/485, Ethernet UDP/TCP, CANopen and Ethernet/IP.

The ST series also has optional encoder feedback with close loop for improved system performance and reliability.

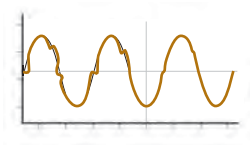
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation
- ✓ Stall Detection and Stall Prevention

Features

Anti-Resonance

Step motor systems have a natural tendency to resonate at certain speeds. The MSST drives automatically calculate the system's natural frequency and apply damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.

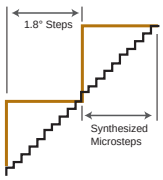
Provides better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low resolution step pulses and create fine resolution motion.

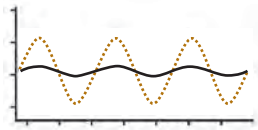
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion profile of the motor. By analyzing this torque ripple the system can apply a negative harmonic to counter this effect. This gives the motor much smoother motion at low speed.

Produces smoother motion at low speeds



Command Signal Smoothing

Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

Improves overall system performance

Stall detection & Stall prevention (only available on drives with encoder option)

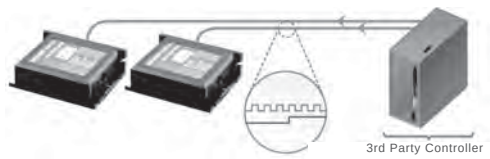
The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Auto Setup & Self Test

At start-up the drive measures motor parameters, including the resistance and inductance, then uses this information to optimize the system performance. The drive can also detect open and short circuits.

Which model is right for your application?

Step & Direction



S

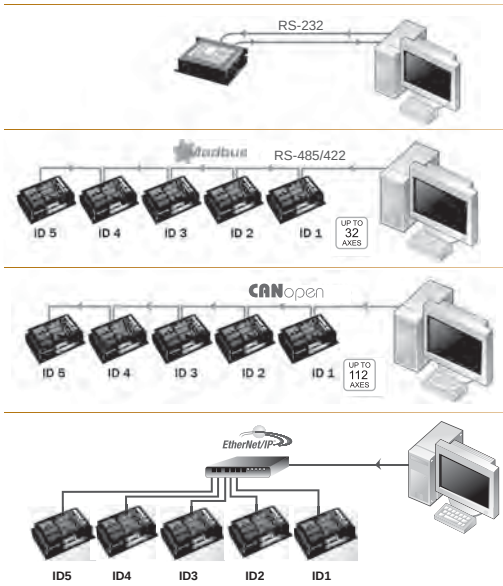
- Step & Direction
- CW & CCW pulse
- Master Encoder

Oscillator / Run-Stop

S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

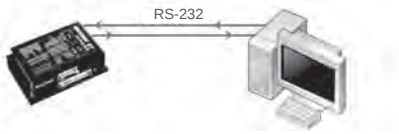
Host Control



S Q C IP

- Accepts commands from host PC or PLC
- Multi-axis capable
- Real time control

Stand Alone Programmable



Q

- Accepts commands from host PC or PLC
- Multi-axis capable
- Real time control

■ ST Lineup

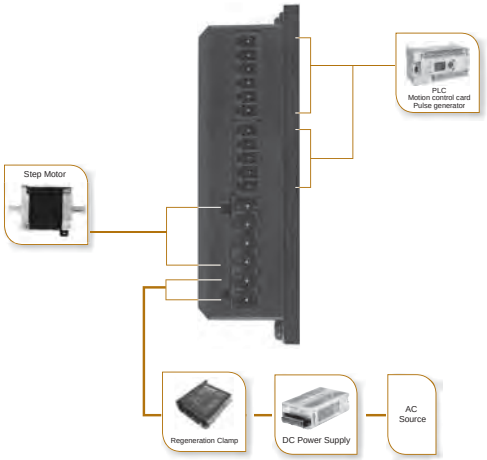
◇ Control Modes

-S Pulse Input Control

Controlled via pulse generator.

Main Features

- Accepts three types of pulse signal input as Pulse&Direction, CW/CCW and A/B Quadrature

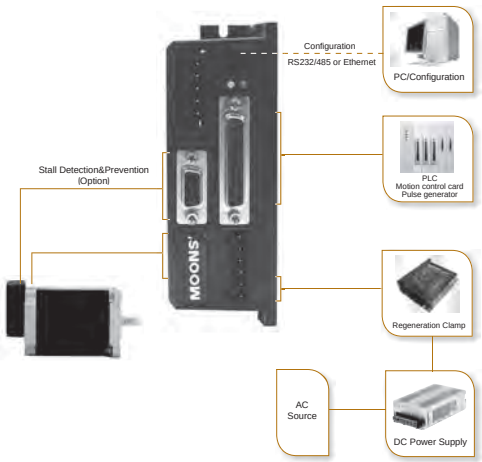


-Q Built-in programmable motion controller (Includes Modbus/RTU Type)

Run stand-alone with sophisticated and functional programs. Commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

Main Features

- Stand-alone operation plus Serial host control
- Math operations
- Register manipulation
- Multi-tasking
- With all features in S type

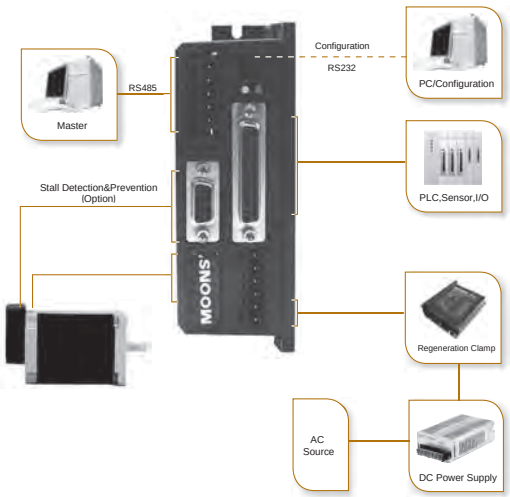


-S/Q Basic type with RS-232/RS-485 communication

Controlled via pulse signals, analog signal or MOONS' SCL streaming series commands.

Main Features

- Pulse control
- Analog control
- Host real time control using SCL via RS-232/RS-485
- Up to 32 axes per channel for RS-485

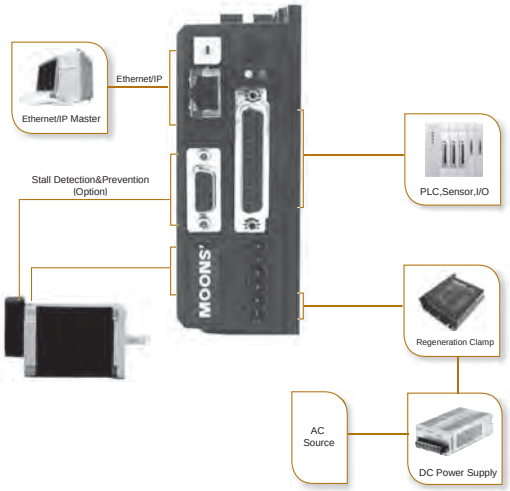


-Q With Ethernet communication

Run stand-alone with sophisticated and functional programs, controlled via MOONS' SCL streaming commands.

Main Features

- Stand-alone operation
- Host real time control using SCL via Ethernet UDP/TCP

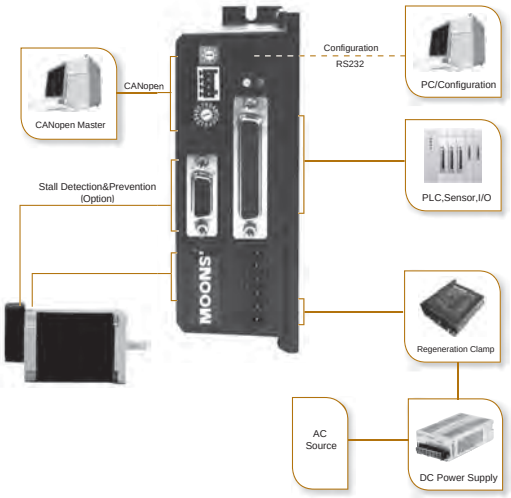


-C With CANopen communication

Operates on a CANopen communication network and conforms to CiA301 and CiA402. It supports runing stored Q programs via MOONS'-specific CANopen objects.

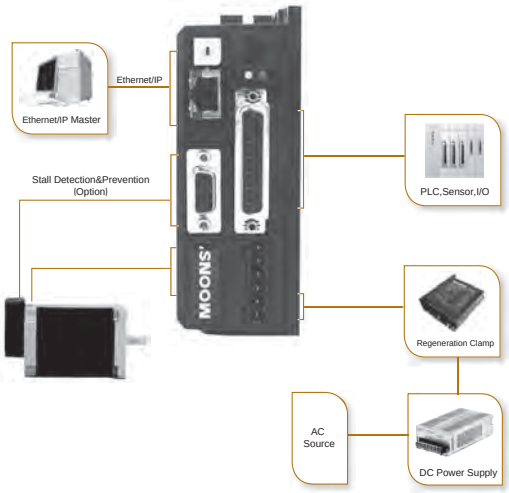
Main Features

- CANopen network
- Up to 112 axes per channel
- Objects for Q programming



-IP With EtherNet/IP communication

Communicate with PLCs and other industrial devices supporting the Ethernet/IP standard. They can also be commanded to execute stored Q programs.



Numbering System

MSST 5 - Q - A E

Series

Output Current
5 = 5A Peak
10= 10A Peak

Control Mode
S = Basic Type
Q = Q Program Type (Modbus/RTU)
C = CANopen
IP = EtherNet/IP

Communication(Blank in S type)
A = RS-232
C = CANopen
E = Ethernet
R = RS-485

Feedback(Blank in S type)
N = None
E = Encoder

Ordering Information

Model	Control	Current	Voltage	Encoder	RS-232	RS-485	Modbus/RTU	CANopen	Ethernet	EtherNet/IP
MSST5-S	S	0.1-5A	24-48VDC		✓					
MSST10-S		0.1-10A	24-75VDC		✓					
MSST5-Q-AN	Q	0.1-5A	24-48VDC		✓					
MSST5-Q-AE				✓	✓					
MSST5-Q-RN					✓	✓	✓			
MSST5-Q-RE				✓	✓	✓	✓			
MSST5-Q-EN									✓	
MSST5-Q-EE				✓					✓	
MSST10-Q-AN		0.1-10A	24-75VDC		✓					
MSST10-Q-AE				✓	✓					
MSST10-Q-RN					✓	✓	✓			
MSST10-Q-RE				✓	✓	✓	✓			
MSST10-Q-EN									✓	
MSST10-Q-EE				✓					✓	
MSST5-C-CN	C	0.1-5A	24-48VDC		✓			✓		
MSST5-C-CE				✓	✓			✓		
MSST10-C-CN		0.1-10A	24-75VDC		✓			✓		
MSST10-C-CE				✓	✓			✓		
MSST5-IP-EN	IP	0.1-5A	24-48VDC						✓	✓
MSST5-IP-EE				✓					✓	✓
MSST10-IP-EN		0.1-10A	24-75VDC						✓	✓
MSST10-IP-EE				✓					✓	✓

Drive Specifications

Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 16 KHz
Protection	Over-voltage, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)
Idle Current	Automatic idle current reduction to reduce heat after motor stops moving, software selectable current and idle delay
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Microstep Emulation	Performs high resolution stepping by synthesizing fine microsteps from coarse steps. Reduces jerk and extraneous system resonances.
Anti-Resonance	Raises the system damping ratio to eliminate midrange instability and allow stable operation throughout the speed range and improves settling time
Torque Ripple Smoothing	Allows for fine adjustment of phase current waveform harmonic content to reduce low-speed torque ripple in the range of 0.25 to 1.5 rps
Encoder Feedback	Optional encoder feedback for stall detection and stall prevention
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Humidity	90% non-condensing
Ambient Temperature	0 - 40°C when mounted to a suitable heat sink
Mass	-S: Approx. 0.2Kg, -Q/C/IP: Approx. 0.3Kg

I/O Specifications

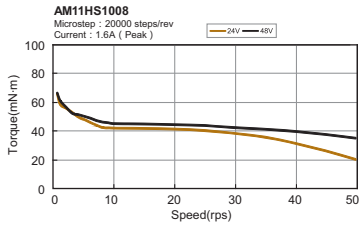
-S	STEP, DIR inputs: Optically isolated, differential, 5 VDC, minimum pulse width = 250 ns, maximum pulse frequency = 2 MHz EN input: Optically isolated, 5-12 VDC OUT output: Optically isolated, 24 VDC max, 10 mA max AIN analog input: Range = 0-5 VDC, resolution = 12 bits
-Q / C / IP	X1, X2 inputs: Optically isolated, differential, 5 VDC, minimum pulse width = 250 ns, maximum pulse frequency = 2 MHz X3-X6 inputs: Optically isolated, single-ended, shared common, sinking or sourcing, 12-24 VDC X7, X8 inputs: Optically isolated, differential, 12-24 VDC Y1-Y3 outputs: Optical darlington, single-ended, shared common, sinking, 30 VDC max, 100 mA max Y4 output: Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max Analog inputs IN1, IN2: Can be used as two single-ended inputs or one differential input. Range =software selectable 0-5, +/-5, 0-10, or +/-10 VDC. Software configurable offset, deadband, and filtering. Resolution = 12 bits (+/-10 volt range), 11 bits (+/-5 or 0-10 volt range), or 10 bits (0-5 volt range).

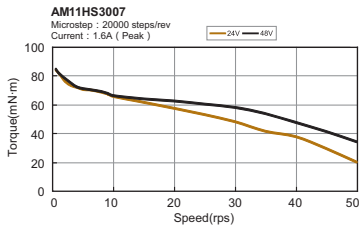
Recommended Motors

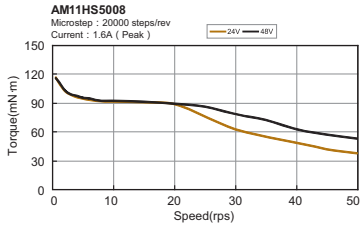
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM11HS1008-07	Single Shaft	A	4	31.0	0.05	1.6	2.5	9.0	0.1	500VAC 1 minute
AM11HS3007-02	Single Shaft			40.0	0.08	1.6	1.7	12.0	0.15	
AM11HS5008-01	Single Shaft			51.0	0.12	1.6	3.5	18.0	0.2	
AM14HYB401-03	Single Shaft			40.0	0.2	1.0	4.3	20.0	0.21	
AM17HD4452-02N	Single Shaft			34.3	0.25	1.8	1.5	38.0	0.23	
AM17HD4452-01N	Double Shaft									
AM17HD2438-02N	Single Shaft			39.8	0.4	1.8	1.9	57.0	0.28	
AM17HD2438-01N	Double Shaft									
AM17HD6426-06N	Single Shaft			48.3	0.5	1.8	2.3	82.0	0.36	
AM17HD6426-05N	Double Shaft									
AM17HDB410-01N	Single Shaft			62.8	0.8	1.6	2.6	123	0.6	
AM23HS0420-01	Single Shaft			41.0	0.6	2.2	1.8	135.0	0.42	
AM23HS0420-02	Double Shaft									
AM23HS2449-01	Single Shaft			54.0	1.2	2.2	2.4	260.0	0.6	
AM23HS2449-02	Double Shaft									
AM23HS3454-01	Single Shaft			76.0	1.8	2.2	2.9	460.0	1.0	
AM23HS3454-02	Double Shaft									
AM23HS0421-01	Single Shaft			41.0	0.6	4.5	0.48	135.0	0.42	
AM23HS0421-02	Double Shaft									
AM23HS2450-01	Single Shaft			54.0	1.2	4.5	0.63	260.0	0.6	
AM23HS2450-02	Double Shaft									
AM23HS3455-01	Single Shaft			76.0	1.8	4.5	0.75	460.0	1.0	
AM23HS3455-02	Double Shaft									
AM23HS5412-01	Single Shaft			111.0	3.2	4.5	1.2	750.0	1.5	
AM24HS2402-08N	Single Shaft			54.0	1.2	4.5	0.43	450.0	0.83	
AM24HS5401-10N	Single Shaft			85.0	2.5	4.5	0.65	900.0	1.4	
AM24HS5401-24N	Double Shaft									
AM34HD0404-08	Single Shaft			66.5	3.0	7.0	0.24	1100.0	1.6	
AM34HD0404-09	Double Shaft									
AM34HD1404-06	Single Shaft			96.0	5.0	7.0	0.33	1850.0	2.7	
AM34HD1404-07	Double Shaft									
AM34HD2403-07	Single Shaft			125.5	7.1	7.0	0.49	2750.0	3.8	
AM34HD2403-08	Double Shaft									

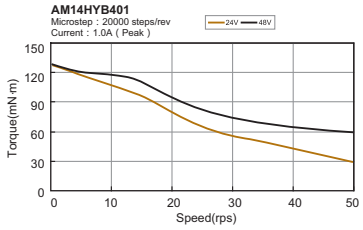
* Wiring Diagram A See Page 195

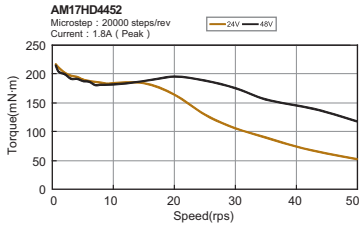
Torque Curves

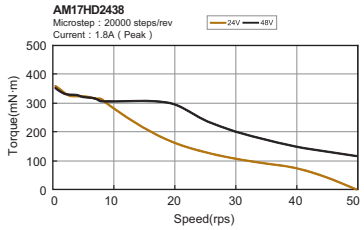


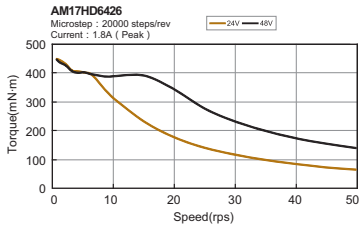


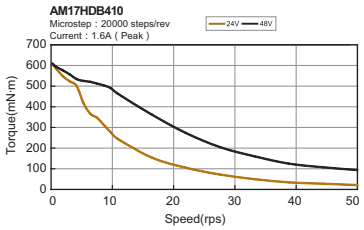


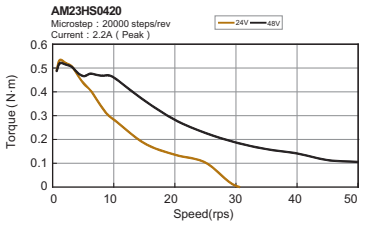


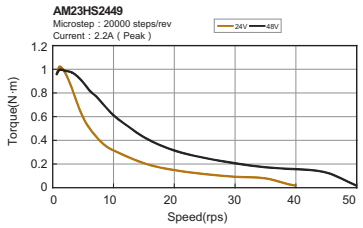


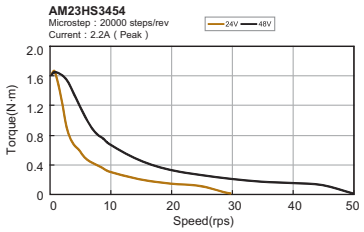


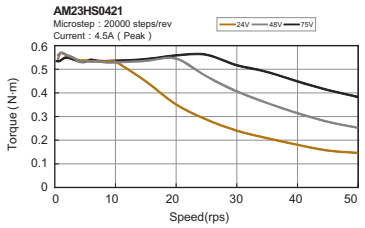


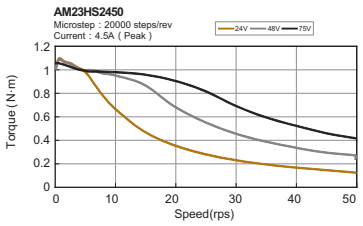


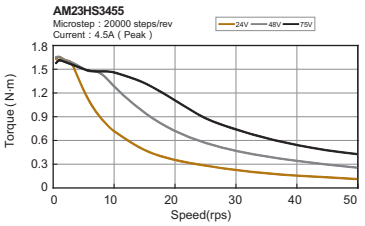


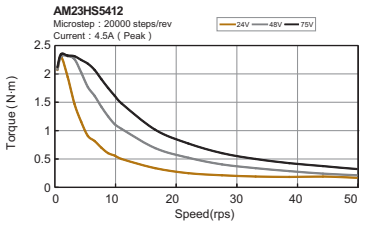


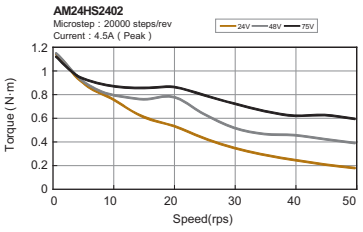


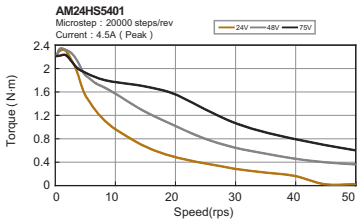


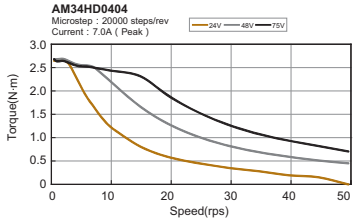


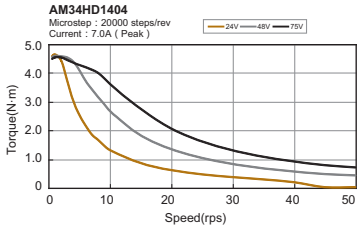


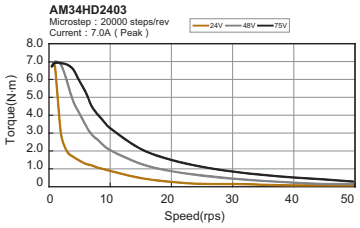






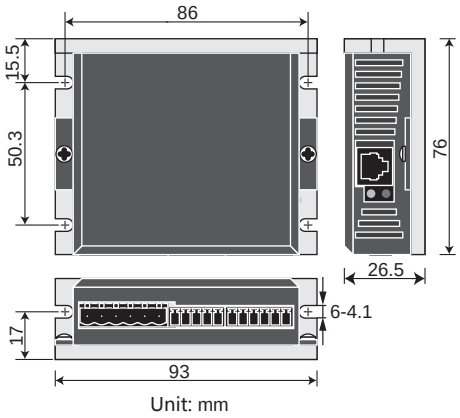




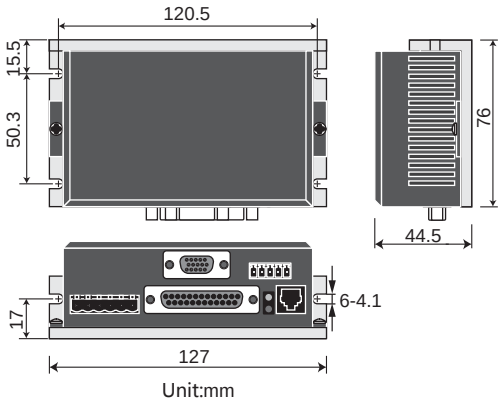


Dimensions(unit:mm)

◇ MSST5/10-S



◇ MSST5/10-Q/C/IP

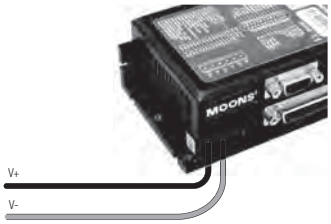


Connecting the Power Supply

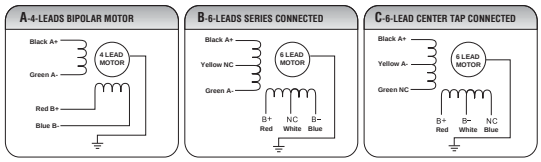
Connect the motor power supply “+” terminal to the driver terminal labeled “VDC”. Connect power supply “-” to the drive terminal labeled “GND”. Use 18 or 20 gauge wire. The MSST drives contain an internal fuse that connects to the power supply + terminal. This fuse is not user replaceable. If you want to install a user servicable fuse in your system install a fast acting fuse in line with the + power supply lead. Use a 4 amp fuse for the MSST5 drives and 7 amps for the MSST10.

MSST5 Supply Voltage: 24-48VDC

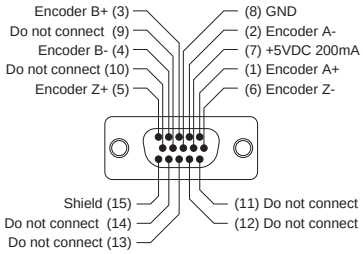
MSST10 Supply Voltage: 24-75VDC



Connecting the Motor



Connecting an Encoder



MSST-Q/C/IP types are available with optional Encoder feedback for closed loop and provide following features:

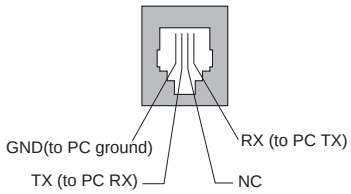
- Stall Detection: Detects the moment the motor has stalled and triggers a drive fault.
- Position Maintenance: maintains shaft position when the motor is stopped.
- Stall Prevention: automatically senses rotor lag and avoid stalling.

Connecting I/O(DB25 connector on Q/C/IP type)

Type	Pin No.	Assignment	Description
Analog Input	1	Analog IN1	Analog Input 1,2
	2	Analog IN2	
	3	N/C	N/C
Digital Input	4	X6/CCWJOG	Digital Input 3-6 (Single ended)
	5	X5/CWJOG	
	6	X4/Alarm Reset	
	7	X3/Enable	
	8	X COMMON	Digital Input COM
	9	X2/DIR-	Digital Input 2 (Differential)
	10	X2/DIR+	
	11	X1/STEP-	Digital Input 1 (Differential)
	12	X1/STEP+	
	13	GND	Earth Ground
Digital Output	14	Y1/BRAKE+	Digital Output 1-3 (Single ended)
	15	Y2/MOTION+	
	16	Y3/FAULT+	
	17	Y COMMON	Digital Output COM
	18	+5OUT	+5V OUT
	19	GND	Earth Ground
Digital Output	20	Y4+	Digital Output (Differential)
	21	Y4-	
Digital Input	22	X7/CWLIMIT+	Digital Input 7 (Differential)
	23	X7/CWLIMIT-	
	24	X8/CCWLIMIT+	Digital Input 8 (Differential)
	25	X8/CCWLIMIT-	

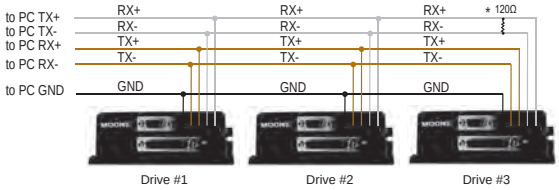
Communication Connector

Connecting to the Host using RS-232

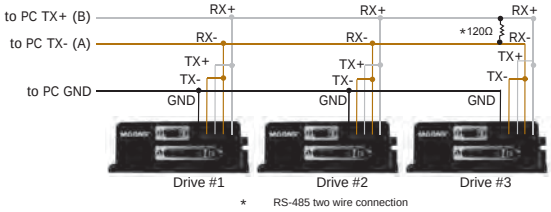


Baud Rate set by ST Configurator software
9600/19200/38400/57600/115200

Connecting to a Host using RS-485



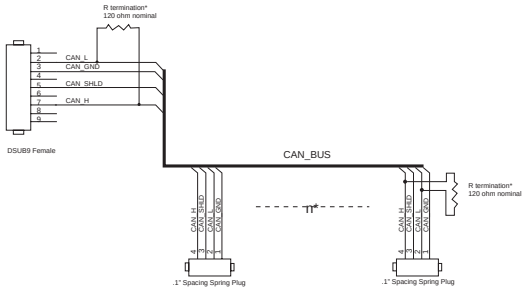
* RS-485 four wire connection



* RS-485 two wire connection

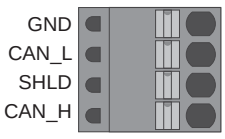
Baud Rate set by ST Configurator software
9600/19200/38400/57600/115200
RS-485 address set by ST Configurator software

Connecting a CANopen network



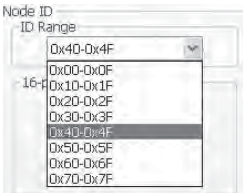
R termination:
Network must be terminated at each end with a 120 ohm resistor.

n:
Cable may be made with up to 112 drive connectors. Termination is only required at each end.



Node ID

Each node ID on a CANopen network must have a unique Node ID. The Node ID is configured using a sixteen position switch to set the lower four bits of the Node ID while the upper three bits are configured by using ST Configurator. CANopen Node IDs are seven bits long, with a range of 1 - 112, or 0x01 - 0x7F in hexadecimal notation. Node ID 0x00 is reserved in accordance with the CiA 301 specification.



Setting the Bit Rate

The CANopen network bitrate is set by the ten position switch on the front of the drive. The bit rate must be the same for all nodes on the CANopen network. Any changes to the bit rate require either a power cycle or a CANopen reset command to take effect.

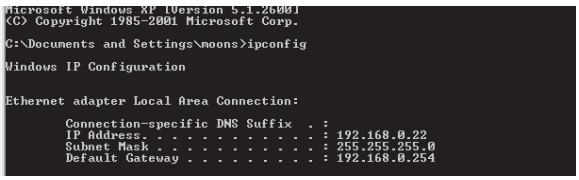
Switch Setting	Resultant Bit Rate
0	1 Mbps
1	800 kbps
2	500 kbps
3	250 kbps
4	125 kbps
5	50 kbps
6	20 kbps
7	12.5 kbps

◇ Connecting to PC using Ethernet

Addresses, Subnets, and Ports

Every device on an Ethernet network must have a unique IP address. In order for two devices to communicate with each other, they must both be connected to the network and they must have IP addresses that are on the same subnet. A subnet is a logical division of a larger network. Members of one subnet are generally not able to communicate with members of another unless they are connected through special network equipment (e.g. router). Subnets are defined by the choices of IP addresses and subnet masks.

If you want to know the IP address and subnet mask of your PC, select Start…All Programs…Accessories…Command Prompt. Then type “ipconfig” and press Enter. You should see something like this:



If your PC’s subnet mask is set to 255.255.255.0, a common setting known as a Class C subnet mask, then your machine can only talk to another network device whose IP address matches yours in the first three octets. (The numbers between the dots in an IP address are called octets.)
For example, if your PC is on a Class C subnet and has an IP address of 192.168.0.20, it can talk to a device at 192.168.0.40, but not one at 192.168.1.40. If you change your subnet mask to 255.255.0.0 (Class B) you can talk to any device whose first two octets match yours. Be sure to ask your system administrator before doing this. You network may be segmented for a reason.

IP Address*

0	10.10.10.10
1	192.168.1.10
2	192.168.1.20
3	192.168.1.30
4	192.168.0.40
5	192.168.0.50
6	192.168.0.60
7	192.168.0.70
8	192.168.0.80
9	192.168.0.90
A	192.168.0.100
B	192.168.0.110
C	192.168.0.120
D	192.168.0.130
E	192.168.0.140
F	DHCP

Your drive includes a 16 position rotary switch for setting its IP address. The factory default ddress for each switch setting is shown in the table to the right.

Settings 1 through E can be changed using the ST Configurator software (use ST Configurator for MSSSTAC5 drives). Setting 0 is always “10.10.10.10”, the universal recovery address. If someone were to change the other settings and not write it down or tell anyone then you will not be able to communicate with your drive. The only way to “recover” it is to use the universal recovery address.

Setting F is “DHCP”, which commands the drive to get an IP address from a DHCP server on the network. The IP address automatically assigned by the DHCP server may be “dynamic” or “static” depending on how the administrator has configured DHCP. The DHCP setting is reserved for advanced users.

Your PC, or any other device that you use to communicate with the drive, will also have a unique address.

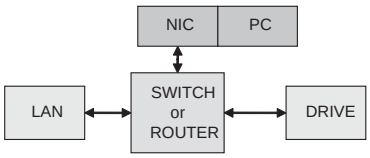
On the drive, switch settings 1 through E use the standard class B subnet mask (i.e. “255.255.0.0”). The mask for the universal recovery address is the standard class A (i.e. “255.0.0.0”). One of the great features of Ethernet is the ability for many applications to share the network at the same time. Ports are used to direct traffic to the right application once it gets to the right IP address. The UDP eSCL port in our drives is 7775. To send and receive commands using TCP, use port number 7776. You’ll need to know this when you begin to write your own application. You will also need to choose an open (unused) port number for your application. Our drive doesn’t care what that is; when the first command is sent to the drive, the drive will make note of the IP address and port number from which it originated and direct any responses there. The drive will also refuse any traffic from other IP addresses that is headed for the eSCL port. The first application to talk to a drive “owns” the drive. This lock is only reset when the drive powers down.

If you need help choosing a port number for your application, you can find a list of commonly used port numbers at http://www.iana.org/assignments/port-numbers.

One final note: Ethernet communication can use one or both of two “transport protocols”: UDP and TCP. eSCL commands can be sent and received using either protocol. UDP is simpler and more efficient than TCP, but TCP is more reliable on large or very busy networks where UDP packets might occasionally be dropped.

Option 1: Connect a Drive to Your Local Area Network

If you have a spare port on a switch or router and if you are able to set your drive to an IP address that is compatible with your network, and not used by anything else, this is a simple way to get connected. This technique also allows you to connect multiple drives to your PC. If you are on a corporate network, please check with your system administrator before connecting anything new to the network. He or she should be able assign you a suitable address and help you get going.



If you are not sure which addresses are already used on your network, you can find out using “Angry IP scanner”, which can be downloaded free from http://www.angryip.org/w/Download. But be careful: an address might appear to be unused because a computer or other device is currently turned off. And many networks use dynamic addressing where a DHCP server assigns addresses “on demand”.The address you choose for your drive might get assigned to something else by the DHCP server at another time.

Once you’ve chosen an appropriate IP address for your drive, set the rotary switch according the address table above. If none of the default addresses are acceptable for your network, you can enter a new table of IP addresses using Confi gurator. If your network uses addresses starting with 192.168.0, the most common subnet, you will want to choose an address from switch settings 4 through E. Another common subnet is 192.168.1. If your network uses addresses in this range, the compatible default selections are 1, 2 and 3. If your PC address is not in one of the above private subnets, you will have to change your subnet mask to 255.255.0.0 in order to talk to your drive. To change your subnet mask:

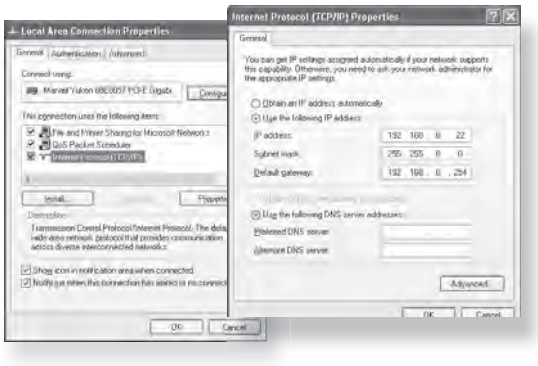
1. On Windows XP, right click on “My Network Places” and select properties. On Windows 7, click Computer. Scroll down the left pane until you see “Network”. Right click and select properties. Select “Change adapter settings”

2. You should see an icon for your network interface card (NIC). Right click and select properties.

3. Scroll down until you see “Internet Properties (TCP/IP)”. Select this item and click the Properties button. On Windows 7 and Vista, look for “(TCP/IPv4)”

4. If the option “Obtain an IP address automatically” is selected, your PC is getting an IP address and a subnet mask from the DHCP server. Please cancel this dialog and proceed to the next section “Using DHCP”.

5. If the option “Use the following IP address” is selected, life is good. Change the subnet mask to “255.255.0.0” and click OK.



Using DCHP

If you want to use your drive on a network that where all or most of the devices use dynamic IP addresses supplied by a DHCP server, set the rotary switch to “F”. When the drive is connected to the network and powered on, it will obtain an IP address and a subnet mask from the server that is compatible with your PC. The only catch is that you won’t know what address the server assigns to your drive. Ethernet Configurator can find your drive using the Drive Discovery feature, as long as your network isn’t too large. With the drive connected to the network and powered on, select Drive Discovery from the Drive menu.

You will see a dialog such as this:

Normally, Drive Discovery will only detect one network interface card (NIC), and will select it automatically. If you are using a laptop and have both wireless and wired network connections, a second NIC may appear. Please select the NIC that you use to connect to the network to which you’ve connected your drive. Then click OK. Drive Discovery will notify you as soon as it has detected a drive.

If you think this is the correct drive, click Yes. If you’re not sure, click Not Sure and Drive Discovery will look for additional drives on you network. Once you’ve told Drive Discovery which drive is yours, it will automatically enter that drive’s IP address in the IP address text box so that you are ready to communicate.

Option 2: Connect a Drive Directly to Your PC

It doesn’t get much simpler than this:

1. Connect one end of a CAT5 Ethernet cable into the LAN card (NIC) on your PC and the other into the drive. You don’t need a special “crossover cable”; the drive will automatically detect the direct connection and make the necessary physical layer changes.

2. Set the IP address on the drive to “10.10.10.10” by setting the rotary switch at “0”.

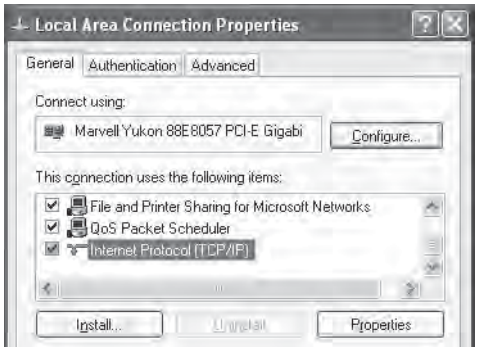
3. To set the IP address of your PC:

   a. On Windows XP, right click on “My Network Places” and select properties.
   b. On Windows 7, click Computer. Scroll down the left pane until you see “Network”. Right click and select properties. Select “Change adapter settings”

4. You should see an icon for your network interface card (NIC). Right click and select properties.

   a. Scroll down until you see “Internet Properties (TCP/IP)”. Select this item and click the Properties button.

   b. On Windows 7 and Vista, look for “(TCP/IPv4)”



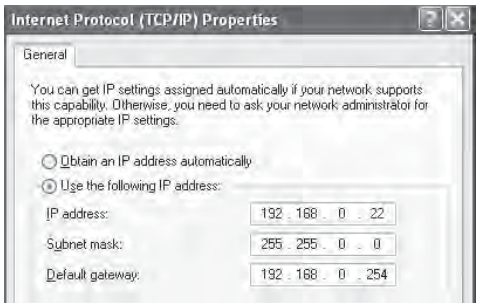
5. Select the option “Use the following IP address”. Then enter the address “10.10.10.11”. This will give your PC an IP address that is

on the same subnet as the drive. Windows will know to direct any traffic intended for the drive’s IP address to this interface card.

6. Next, enter the subnet mask as “255.255.255.0”.

7. Be sure to leave “Default gateway” blank. This will prevent your PC from looking for a router on this subnet.

8. Because you are connected directly to the drive, anytime the drive is not powered on your PC will annoy you with a small message bubble in the corner of your screen saying “The network cable is unplugged.”



Option 3: Use Two Network Interface Cards (NICs)

This technique allows you to keep your PC connected to your LAN, but keeps the drive off the LAN, preventing possible IP conflicts or excessive traffic.

1. If you use a desktop PC and have a spare card slot, install a second NIC and connect it directly to the drive using a CAT5 cable. You don’t need a special “crossover cable”; the drive will automatically detect the direct connection and make the necessary physical layer changes.

2. If you use a laptop and only connect to your LAN using wireless networking, you can use the built-in RJ45 Ethernet connection as your second NIC.

3. Set the IP address on the drive to “10.10.10.10” by setting the rotary switch at “0”.

4. To set the IP address of the second NIC:

   a. On Windows XP, right click on “My Network Places” and select properties.

   b. On Windows 7, click Computer. Scroll down the left pane until you see “Network”. Right click and select properties. Select “Change adapter settings”

5. You should see an icon for your newly instated NIC. Right click again and select properties.

   a. Scroll down until you see “Internet Properties (TCP/IP)”. Select this item and click the Properties button.

   b. On Windows 7 and Vista, look for “(TCP/IPv4)”

6. Select the option “Use the following IP address”. Then enter the address “10.10.10.11”. This will give your PC an IP address that is on the same subnet as the drive. Windows will know to direct any traffic intended for the drive’s IP address to this interface card.

7. Next, enter the subnet mask as “255.255.255.0”. Be sure to leave “Default gateway” blank. This will prevent your PC from looking for a router on this subnet.

8. Because you are connected directly to the drive, anytime the drive is not powered on your PC will annoy you with a small message bubble in the corner of your screen saying “The network cable is unplugged.”

3-Phase Stepper Drive

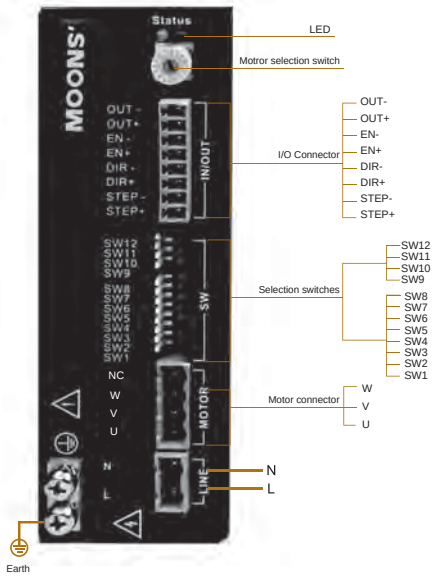
3SRAC2- 3-Phase AC Input Stepper Drive

CE RoHS

Features

- Input Voltage: 80-265VAC
- Output Current: 2.5(Peak)
- 3 Digital signal input, step/direction/enable Optically isolated 5-24VDC
- 1 Digital output: Fault Output
- 16 different resolutions selectable via switches SW1-SW4(step/rev):
  200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000, 10000, 20000, 25000
- 8 different current levels selectable via switches SW5-SW7:
  0.6A, 0.8A, 1.0A, 1.2A, 1.6A, 1.8A, 2.0A, 2.5A
- Rotary switch selects motor and Dip switch SW10 selects load intertia for optimized current control
- Digital filters prevent position error from electrical noise on command signals, Dip switch selectable SW9 2MHz or 150KHz
- Switch SW11 selectable microstep emulation provides smoother, more reliable motion
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW8
- Self Test, selectable via Dip switch SW12
- Protection: over voltage,under voltage, over current, open motor winding

Connection Interface



Electrical Specifications

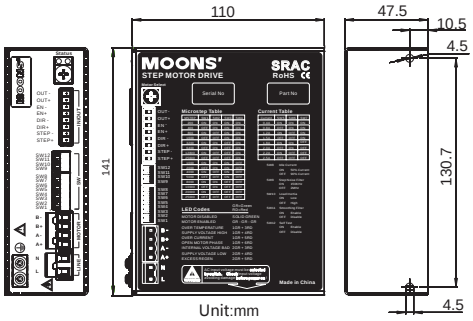
Parameter	Min.	Typ.	Max.	Units
Power Supply	80	-	265	VAC
Output Current (Peak)	0.6	-	2.5	Amps
Cost current of digital input signal	6	10	15	mA
Step Signal Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	75*/135*	-	VAC
Over Voltage Protection	-	145*/295*	-	VAC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

***Note:** When the AC input switch is selected on 115V, under voltage protection point is 75VAC, over voltage protection point is 145VAC. When the input switch is selected on 230V status, under voltage protection point is 135VAC, over voltage protection point is 295VAC.

Mass

0.8kg

Dimensions(Unit:mm)



Ordering Information

Model	Description
3SRAC2	Standard, 0.6-2.5A ,80-265VAC

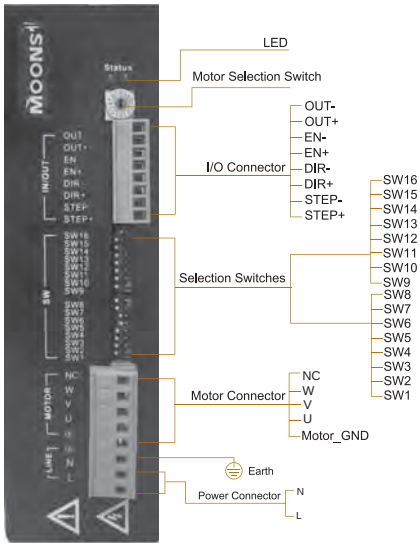
3SRAC8 - 3-Phase AC Input Stepper Drive

CE RoHS

Features

- Input Voltage: 80-265VAC
- Output Current: 8.0A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 1 Digital output: Fault Output
- 16 different resolutions selectable via switches SW1-SW4(step/rev):
  200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000, 10000, 20000, 25000
- 16 different current levels selectable via switches SW5-SW8:
  0.4A, 0.6A, 0.9A, 1.2A, 1.5A, 2.0A, 2.5A, 3.0A, 3.5A, 4.0A, 4.5A, 5.2A, 5.9A, 6.6A, 7.3A, 8.0A
- Digital filters prevent position error from electrical noise on command signals, Dip switch SW14 selectable 2MHz or 150KHz
- Switch selectable SW15 microstep emulation provides smoother, more reliable motion
- Idel Curent Reduction:25%,50%,70% or 90%, selectable SW9-10 via Dip switchs
- Self Test, selectable SW16 via Dip switchs
- Protection: over voltage,under voltage, over current, open motor winding

Connection Interface



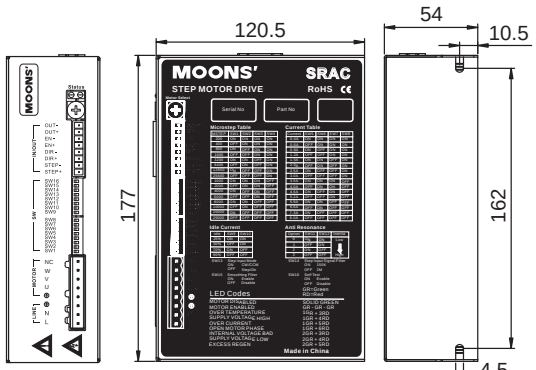
Electrical Specifications

Parameter	Min.	Typ.	Max.	Units
Power Supply	80	-	265	VAC
Output Current (Peak)	0.4	-	8	Amps
Cost current of digital input signal	6	10	15	mA
Step Signal Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	80	-	VAC
Over Voltage Protection	-	295	-	VAC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

Mass

1.2kg

Dimensions(Unit:mm)



Ordering Information

Model	Description
3SRAC8	Standard, 0.4-8.0A, 80-265VAC

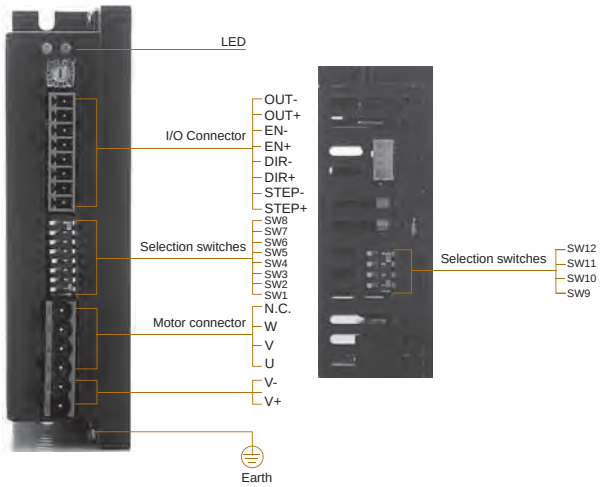
3SR8-Plus - 3-Phase DC Input Stepper Motor Drive

CE RoHS

Features

- Input Voltage: 24-75VDC
- Output Current: 7.8A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 1 Digital output: Fault Output
- 16 different resolutions selectable via switches SW5-SW8(step/rev):
  200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000, 10000, 20000, 25000
- 8 different current levels selectable via switches SW1-SW3:
  1.5A, 2.0A, 3.0A, 4.0A, 5.2A, 5.8A, 7.0A, 7.8A
- Rotary switch selects motor and Dip switch SW11 selects load intertia for optimized current control
- Digital filters prevent position error from electrical noise on command signals, Dip switch SW12 selectable 2MHz or 150KHz
- Switch SW10 selectable microstep emulation provides smoother, more reliable motion
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW4
- Self Test, selectable via Dip switch SW9
- Protection: over voltage, under voltage, over current, open motor winding

Connection Interface



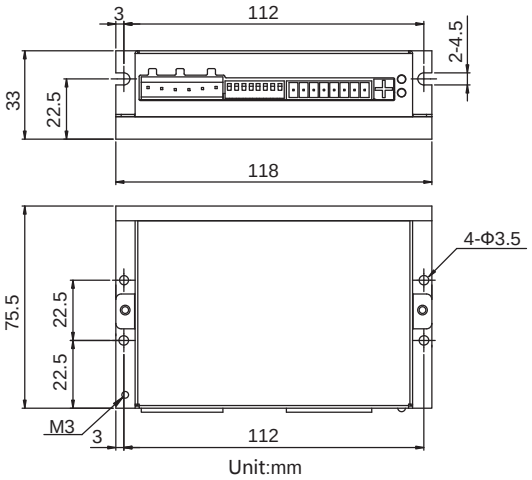
Electrical Specifications

Parameter	Min.	Type.	Max.	Unit
Power Supply	24	–	75	VDC
Output Current (Peak)	2.4	–	7.8	Amps
Step Frequency	2	–	2M	Hz
STEP minimum pulse width	250	–	–	ns
DIR minimum pulse width	62.5	–	–	us
Under Voltage Protection	–	20	–	V
Over Voltage Protection	–	85	–	V
Input Signal Voltage	4.0	–	28	V
OUT maximum output current	–	–	100	mA
OUT maximum voltage	–	–	30	V

Mass

0.31kg

Dimensions(Unit:mm)



Ordering Information

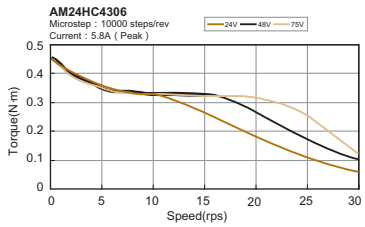
Model	Description
3SR8-Plus	Standard,2.4-7.8A ,24-75VDC

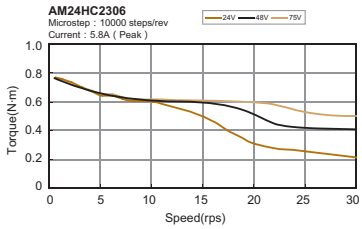
Recommended Motors

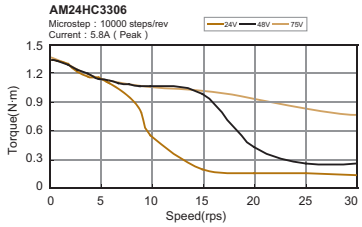
Model	Shaft	Wiring	Leads	Step angle	Length“L”	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
					mm	N·m	A/Phase	Ω/Phase	g·cm^2	Kg	
AM24HC4306-01	单出轴	D	3	1.2°	45.5	0.5	5.8	0.33	180	0.5	500VAC 1 minute
AM24HC2306-01					54.5	0.9		0.4	260	0.8	
AM24HC3306-03					76.5	1.5		0.63	460	1.3	
AM24HC4306-03					45.5	0.5		0.33	180	0.5	
AM24HC2308-02					54.5	0.9		0.4	260	0.8	
AM24HC3306-07					76.5	1.5		0.63	460	1.3	
AM34HC0305-01					66.5	2.5	7.0	0.53	1100	1.6	
AM34HC1305-01					96	4		0.58	1850	2.7	
AM34HC2306-01					125.5	5.5		0.9	2750	3.8	

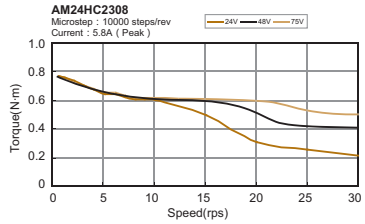
* Wiring Diagram D See Page 195

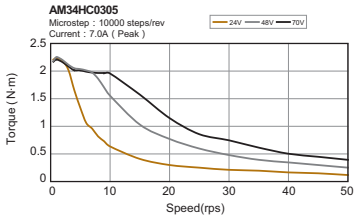
Torque Curves

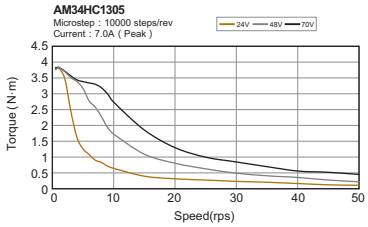


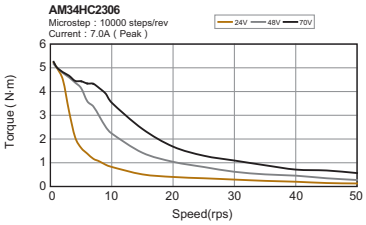










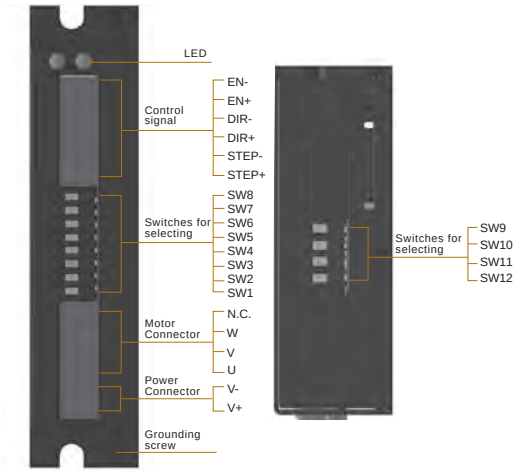


3SR2 - 3-Phase DC Input Stepper Motor Drive

Features

- Input Voltage: 12-48VDC
- Output Current: 2.2A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 1 Digital output: Fault Output
- 16 different resolutions selectable via switches SW5-SW8(step/rev):
  200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000,10000, 20000, 25000
- 8 different current levels selectable via switches SW1-SW3:
  0.3A, 0.5A, 0.7A, 1.0A, 1.3A, 1.6A, 1.9A, 2.2A
- Raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor, dip switch SW11 selectable load inertia
- Digital filters prevent position error from electrical noise on command signals, Dip switch SW12 selectable 2MHz or 150KHz
- Switch SW10 selectable microstep emulation provides smoother, more reliable motion
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW4
- Self Test, selectable via Dip switch SW9
- Protection,over voltage,under voltage, over current,open motor winding

Connection Interface



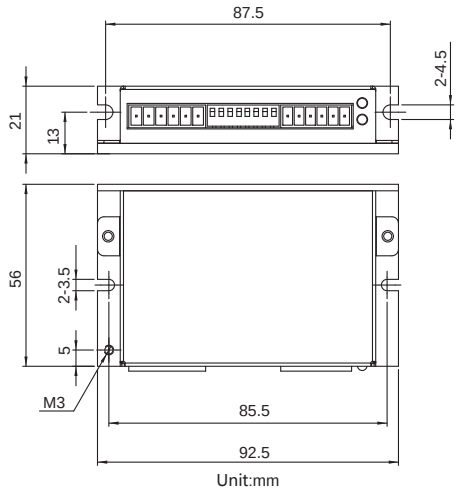
Electrical Specifications

Parameter	Min.	Type.	Max.	Unit
Power Supply	12	-	48	VDC
Output Current (Peak)	0.3	-	2.2	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	10	-	VDC
Over Voltage Protection	-	52	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S

Mass

120g

Dimensions(Unit:mm)



Ordering Information

Model	Description
3SR2	Standard 0.3 - 2.2A, 12 - 48VDC

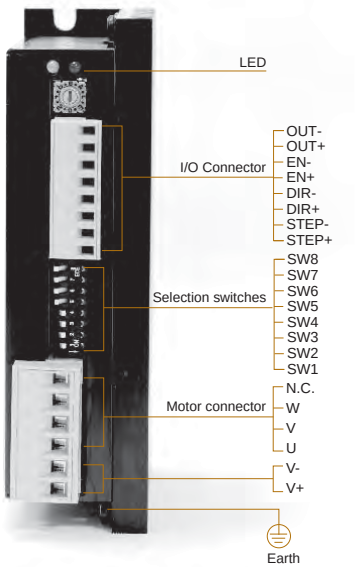
3SR8 - 3-Phase DC Input Stepper Motor Drive

CE RoHS

Features

- Input Voltage: 24-75VDC
- Output Current: 7.8A(Peak)
- 3 Digital signal input, step/direction/enable
  Optically isolated 5-24VDC
- 1 Digital output: Fault Output
- 8 different resolutions selectable via switches SW5-SW7(step/rev):
  1000, 1600, 2000, 3200, 4000, 5000, 6400, 51200
- 8 different current levels selectable via switches SW1-SW3:
  1.5A, 2.0A, 3.0A, 4.0A, 5.2A, 5.8A, 7.0A, 7.8A
- Rotary switch selects motor and load intertia for optimized current control
- Idel Curent Reduction:50% or 90%, selectable via Dip switch SW4
- Self Test, selectable via Dip switch SW8
- Protection: over voltage,under voltage, over current, open motor winding

Connection Interface



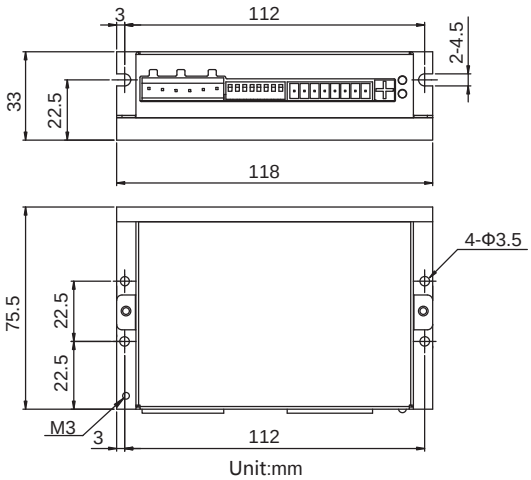
Electrical Specifications

Parameter	Min.	Type.	Max.	Unit
Power Supply	24	-	75	VDC
Output Current (Peak)	2.4	-	7.8	Amps
Cost current of digital input signal	6	10	15	mA
Step Frequency	2	-	2M	Hz
STEP minimum pulse width	250	-	-	ns
DIR minimum pulse width	80	-	-	us
Under Voltage Protection	-	20	-	VDC
Over Voltage Protection	-	85	-	VDC
Input Signal Voltage	4	-	28	VDC
Initialization time	-	-	2.5	S
OUT maximum output current	-	-	100	mA
OUT maximum voltage	-	-	30	VDC

Mass

0.31kg

Dimensions(Unit:mm)



Ordering Information

Model	Description
3SR8	Standard, 1.5-7.8A, 24-75VDC

MS3ST10-S - 3-Phase DC Input Controller Type Stepper Motor Drive

S

Output Current
MS3ST10-S 0.1-10.0A

Input Voltage
MS3ST10-S 24-75VDC

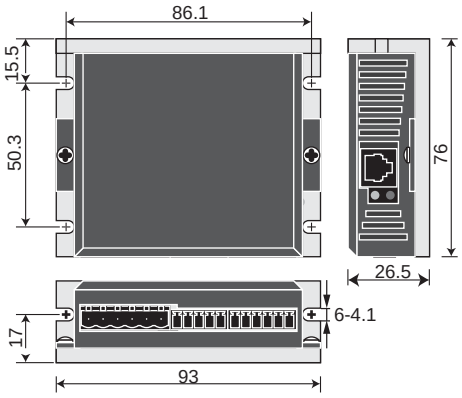
Mass
0.3kg

SCL Compatible

Features
- Software Setup
  Using ST Configurator software
- Microstepping
  300 - 51200 steps/rev
- Pulse Input Type
  Step/Dir, CW/CCW Pulse, A/B Quadrature
- Oscillator Mode
  Run/Stop, Direction, Two Speeds
  Analog Velocity

Software
- ST Configurator
  Easy to use graphical setup software

Inputs and Outputs
3 Digital inputs
1 Digital output
1 Analog input



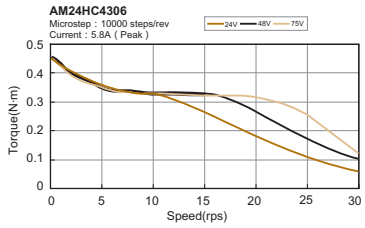
Unit: mm

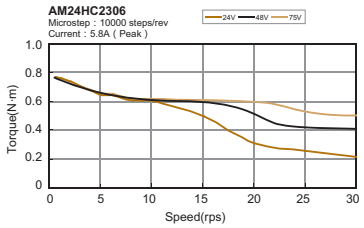
Recommended Motors

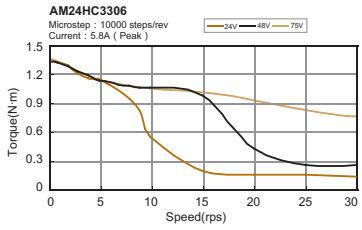
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HC4306-01	Single Shaft	D	3	45.5	0.5	5.8	0.33	180	0.5	500VAC 1 minute
AM24HC2306-01				54.5	0.9		0.4	260	0.8	
AM24HC3306-03				76.5	1.5		0.63	460	1.3	
AM24HC4306-03				45.5	0.5	5.8	0.33	180	0.5	
AM24HC2308-02				54.5	0.9		0.4	260	0.8	
AM24HC3306-07				76.5	1.5		0.63	460	1.3	
AM34HC0305-01				66.5	2.5	7.0	0.53	1100	1.6	
AM34HC1305-01				96	4		0.58	1850	2.7	
AM34HC2306-01				125.5	5.5		0.9	2750	3.8	

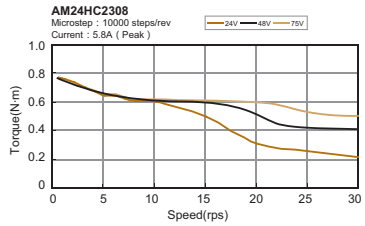
* Wiring Diagram D See Page 195

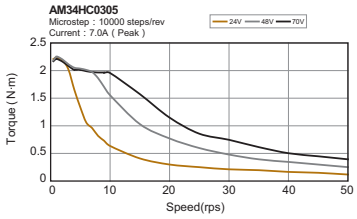
Torque Curves

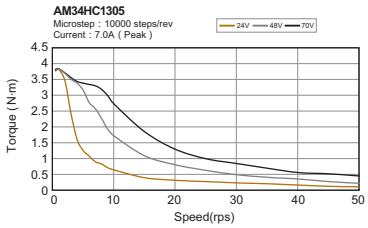


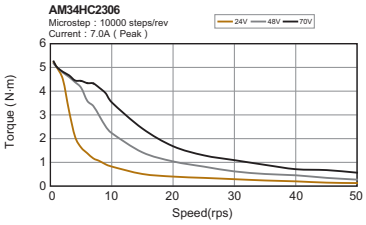












Ordering Information

Model	Description
MS3ST10-S	Standard, 0.1-10A, 24-75VDC

Stepper Motor

Numbering System

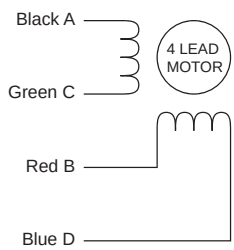
AM 17 HD 0 0 01 - 01

1 2 3 4 5 6 7

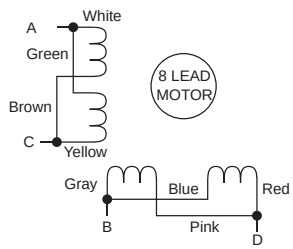
1. Motion Control Standard Series
2. Size: Motor outside diameter in tenths of an inch (Ex: size 17 = 1.7”)
(11:28mm; 14:35mm; 17:42.3mm; 23:56.4mm; 24:60.5mm; 34:86mm)
3. Series:
   HA: step angle 0.9°
   HY,HS,HD: step angle 1.8°
   HC: step angle 1.2°
4. Length of stator
5. Number of lead wires
   0: Connector type
   3: 3 lead wires
   4: 4 lead wires
   6: 6 lead wires
   8: 8 lead wires
6. Electric variation: variety of current, torque, etc.
7. Mechanical variation: variety of shaft, lead wires, screws, brake and encoder, etc.

Wiring Diagrams

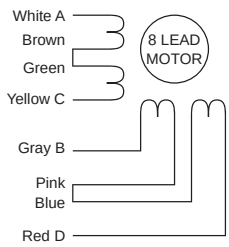
A-4 LEAD BIPOLAR DRIVE



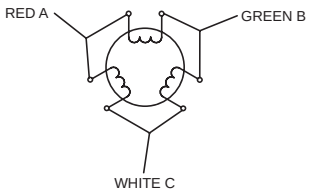
B-8 LEAD BIPOLAR -PARALLEL



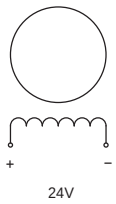
C-8 LEAD BIPOLAR - SERIAL



D-3 LEAD 3 PHASE SERIES



Brake Wiring Diagram

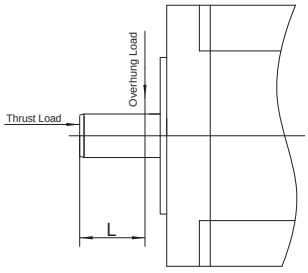


Generall Specifications

Specification		Motor
Step Accuracy		±5%(Tested by: Constant Current Drive/24V/Two Phase On/Rated Current/Full Step:1rps)
Insulation Class		Class B(130°C)
Operating Environment	Ambient Temperature	-10~+50°C(non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Atmosphere	No corrosive gases, dust, water or oil
Temperature Rise		Temperature rise of windings is 80˚C (144˚F) or less measured by the resistance change method. (at rated voltage, at standstill, two phases excited)
Shaft Runout		0.050T.I.R.(mm)
Radial Play		0.02mm Max.(500gf)
Axial Play		0.08mm Max.(500gf)
Concentricity		0.075T.I.R.(mm)
Perpendicularity		0.100T.I.R.(mm)

Permissible Overhung Load and Permissible Thrust Load(Unit:N)

Type	Permissible Overhung Load Distance(L) from Shaft End(mm)					Permissible Thrust Load
	0mm	5mm	10mm	15mm	20mm	
11HS	20	25	34	52	- - -	Less than the motor mass
14HA/14HY	20	25	34	52	- - -	
17HD/17HA/17HC	20	25	34	52	- - -	
23HS	50	60	75	100	150	
24HS/24HC	61	73	90	110	160	
34HD/34HC	260	290	340	390	480	



Motor Installation

Mounting Direction

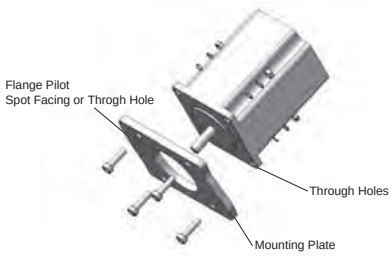
Motors can be mounted freely in any direction as shown below.

Regardless of how the motor is mounted, take care not to apply an overhung load or thrust load on the shaft. Make sure the cable does not contact the mounting surface causing undesirable force on the cable.

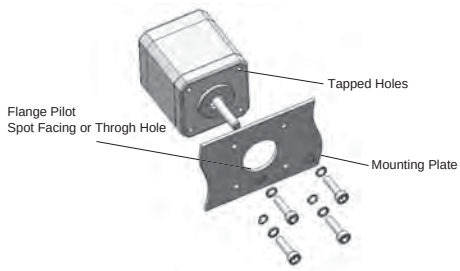
Mounting Method

Considering heat radiation and vibration isolation as much as possible, mount the motor tightly against a metal plane.

- Mounting Method for Through Hole Type



- Mounting Method for Tapped Hole Type



Installation Conditions

Install the motor in a location that meets the following conditions, or the product may be damaged.

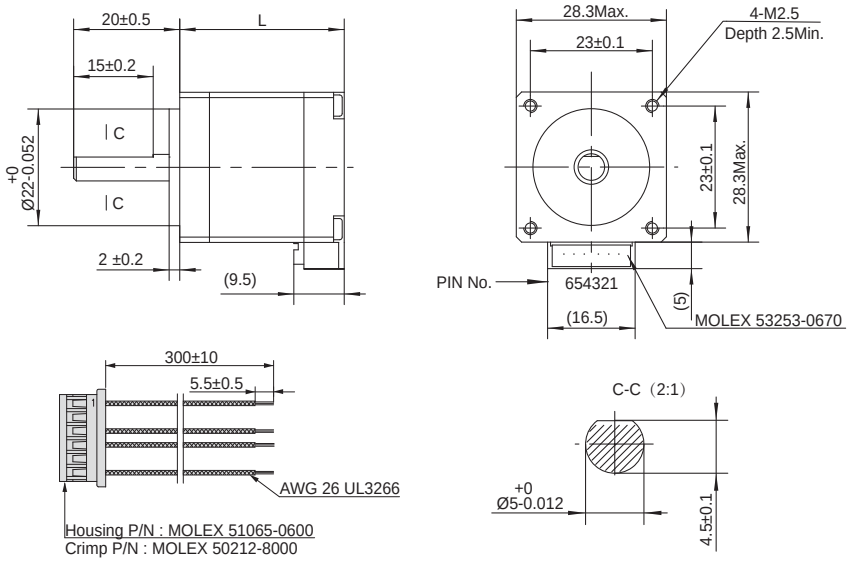
- Indoors (This product is designed and manufactured to be installed within another device.)
- Ambient temperature:–10~+50°C(non-freezing)
- Ambient humidity: 85% or less (non-condensing)
- Not exposed to explosive, flammable or corrosive gases
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water or oil
- A place where heat can escape easily
- Not exposed to continuous vibration or excessive impact

Notes:

When installing the motor in an enclosed space such as a control box, or somewhere close to a heat-radiating object, vent holes should be used to prevent the motor from overheating.

Do not install the motor in a location where a source of vibration will cause the motor to vibrate.

Dimensions (Unit: mm)

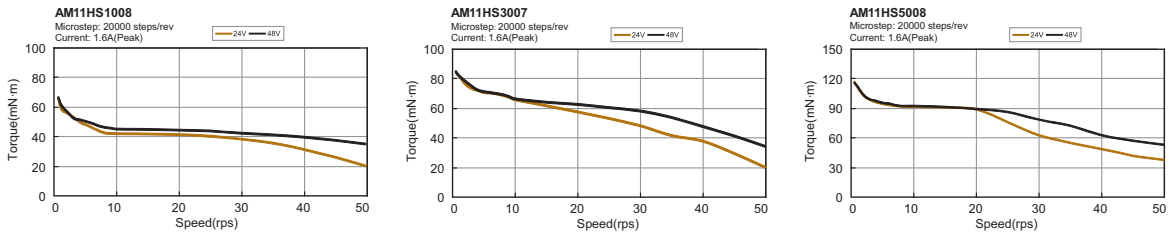


Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM11HS1008-07	Single Shaft	A	4	31.0	0.05	1.6	2.5	9.0	0.1	500VAC 1 minute
AM11HS3007-02	Single Shaft			40.0	0.08	1.6	1.7	12.0	0.15	
AM11HS5008-01	Single Shaft			51.0	0.12	1.6	3.5	18.0	0.2	

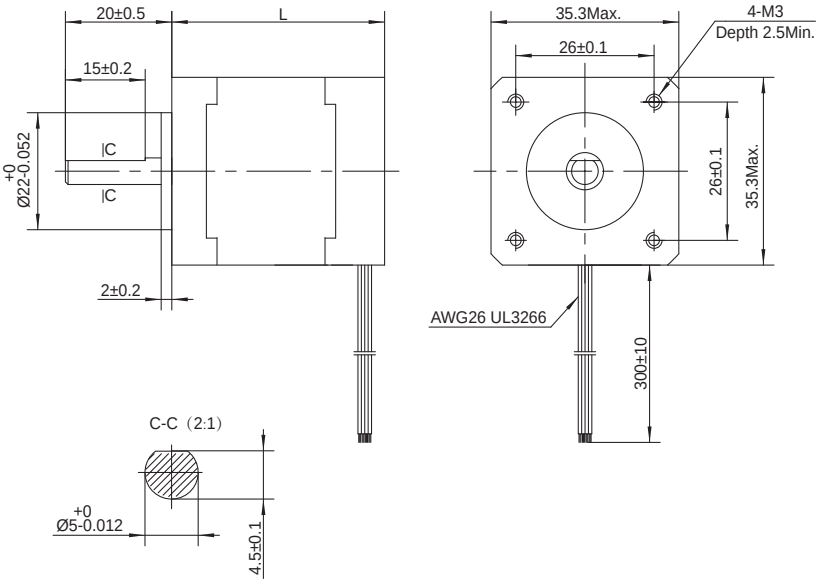
* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)



NEMA14 2-phase DC 1.8°- 14HY Series

Dimensions (Unit: mm)

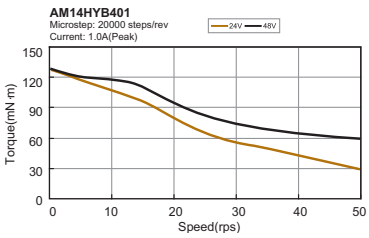


Parameters

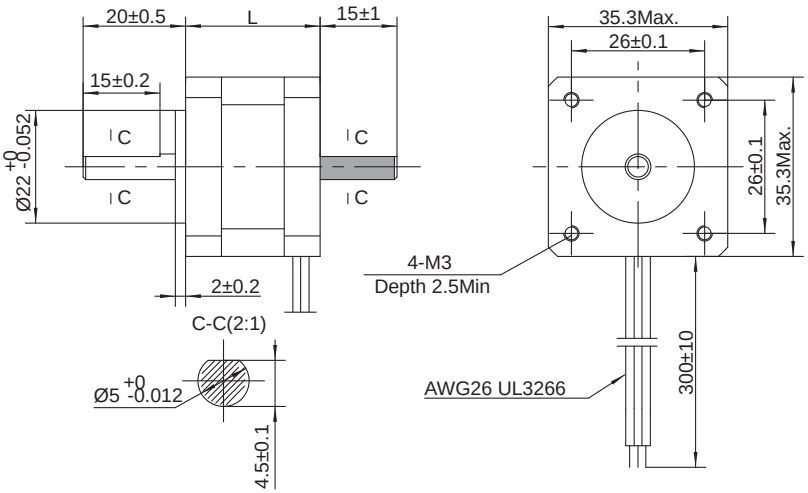
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM14HYB401-03	Single Shaft	A	4	40.0	0.2	1.0	4.3	20.0	0.21	500VAC 1 minute

⋆ Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)



Dimensions (Unit: mm)



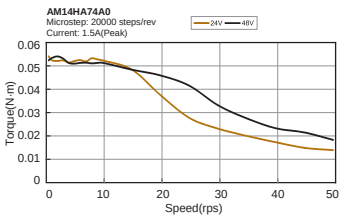
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

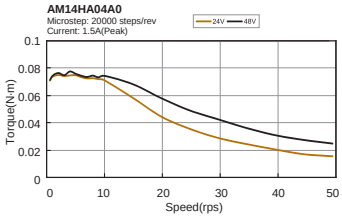
Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM14HA74A0-01N	Single Shaft	A	4	20	0.05	1.5	0.9	10.0	0.09	500VAC 1 minute
AM14HA74A0-02N	Double Shaft									
AM14HA04A0-01N	Single Shaft			28	0.08	1.5	0.9	14.0	0.16	
AM14HA04A0-02N	Double Shaft									

⋆ Wiring Diagram A See Page 195

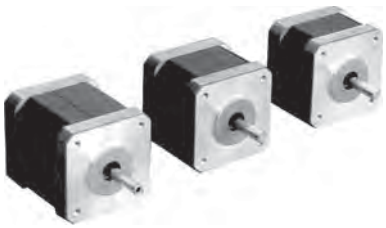
Torque Curves (Recommended Driver: SR or ST)

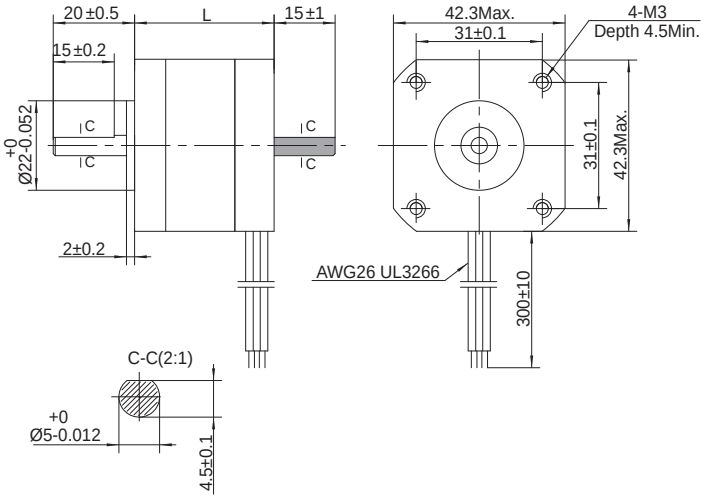




NEMA17 2-phase DC 1.8°- 17HD Series

Dimensions (Unit: mm)



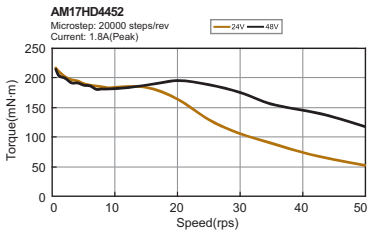


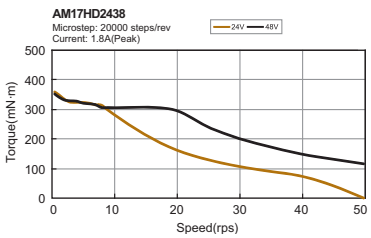
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

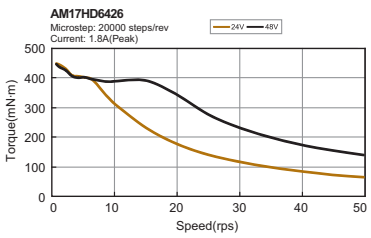
Parameters

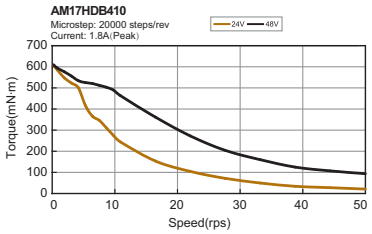
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM17HD4452-02N	Single Shaft	A	4	34.3	0.25	1.8	1.5	38.0	0.23	500VAC 1 minute
AM17HD4452-01N	Double Shaft									
AM17HD2438-02N	Single Shaft			39.8	0.4	1.8	1.9	57.0	0.28	
AM17HD2438-01N	Double Shaft									
AM17HD6426-06N	Single Shaft			48.3	0.5	1.8	2.3	82.0	0.36	
AM17HD6426-05N	Double Shaft									
AM17HDB410-01N	Single Shaft			62.8	0.85	1.6	3.2	123.0	0.6	

Torque Curves (Recommended Driver: SR or ST)

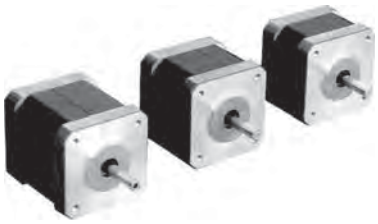


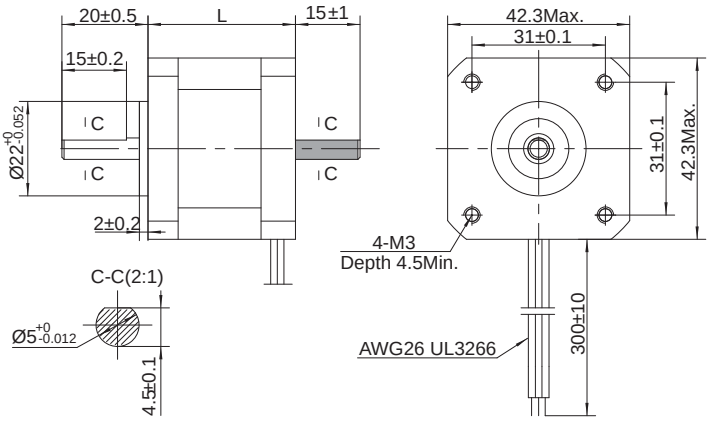






Dimensions (Unit: mm)





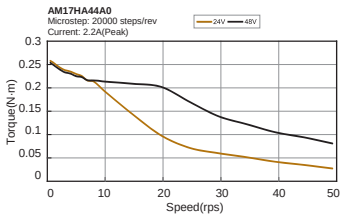
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

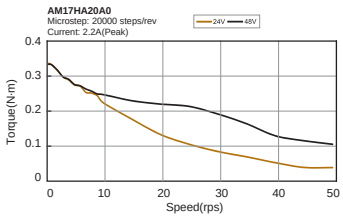
Parameters

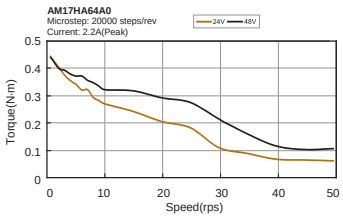
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM17HA44A0-01N	Single Shaft	A	4	34.3	0.25	2.2	1.6	38.0	0.23	500VAC 1 minute
AM17HA44A0-02N	Double Shaft									
AM17HA24A0-01N	Single Shaft			39.3	0.35	2.2	1.65	57.0	0.28	
AM17HA24A0-02N	Double Shaft									
AM17HA64A0-01N	Single Shaft			48.3	0.45	2.2	1.56	82.0	0.36	
AM17HA64A0-02N	Double Shaft									

* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)

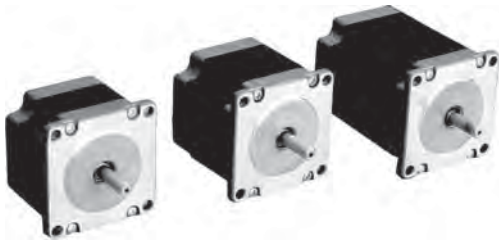


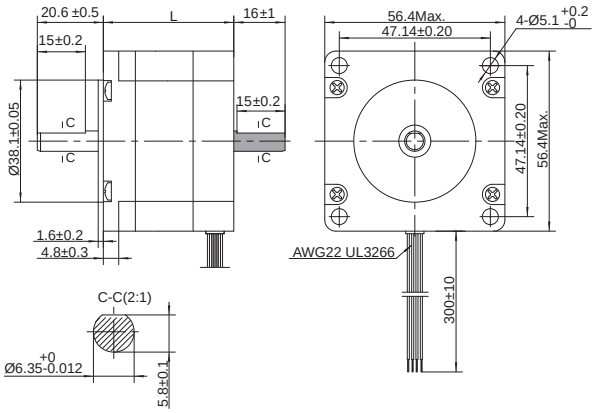




NEMA23 2-phase DC 1.8° - 23HS Series

Dimensions (Unit: mm)





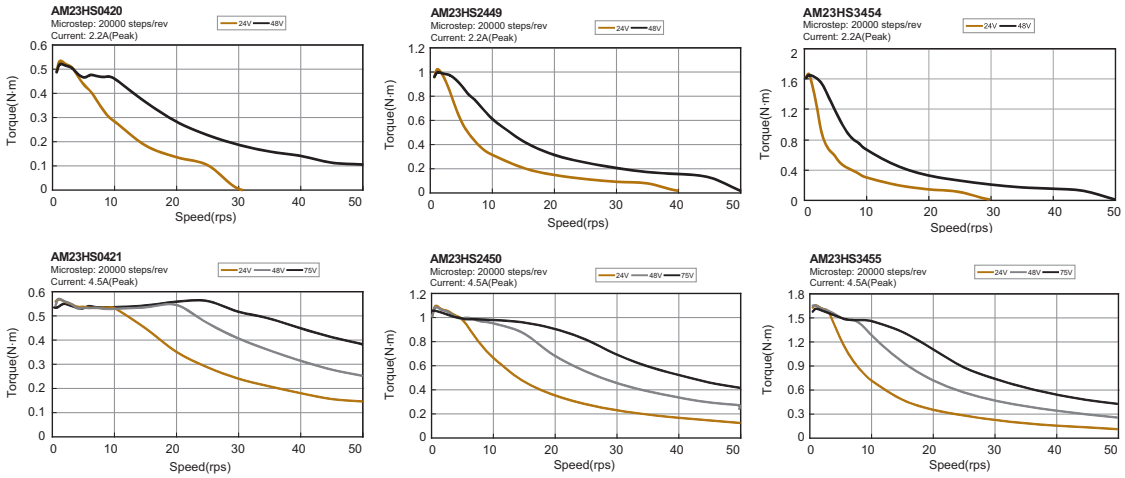
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Parameters

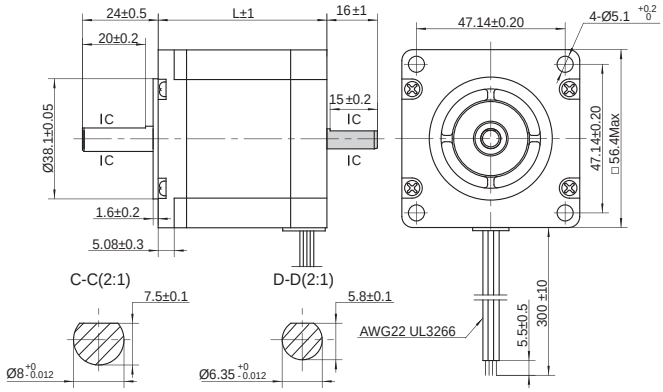
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS0420-01	Single Shaft	A	4	41.0	0.6	2.2	1.8	135.0	0.42	500VAC 1 minute
AM23HS0420-02	Double Shaft									
AM23HS2449-01	Single Shaft			54.0	1.2	2.2	2.4	260.0	0.6	
AM23HS2449-02	Double Shaft									
AM23HS3454-01	Single Shaft			76.0	1.8	2.2	2.9	460.0	1.0	
AM23HS3454-02	Double Shaft									
AM23HS0421-01	Single Shaft			41.0	0.6	4.5	0.48	135.0	0.42	
AM23HS0421-02	Double Shaft									
AM23HS2450-01	Single Shaft			54.0	1.2	4.5	0.63	260.0	0.6	
AM23HS2450-02	Double Shaft									
AM23HS3455-01	Single Shaft			76.0	1.8	4.5	0.75	460.0	1.0	
AM23HS3455-02	Double Shaft									

* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)



Dimensions (Unit: mm)



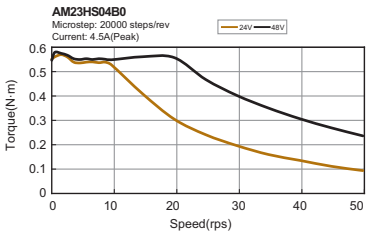
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

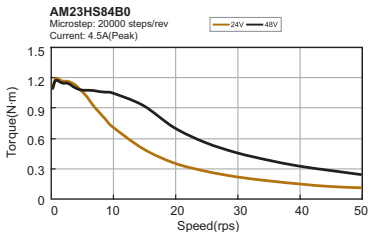
Parameters

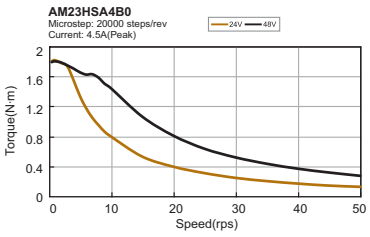
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS04B0-03	Single Shaft	A	4	39	0.82	4.5	0.48	105.0	0.4	
AM23HS04B0-04	Double Shaft									
AM23HS84B0-03	Single Shaft			55	1.5	4.5	0.63	215.0	0.6	
AM23HS84B0-04	Double Shaft									
AM23HSA4B0-03	Single Shaft			77	2.3	4.5	0.75	365.0	1.0	
AM23HSA4B0-04	Double Shaft									

* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)

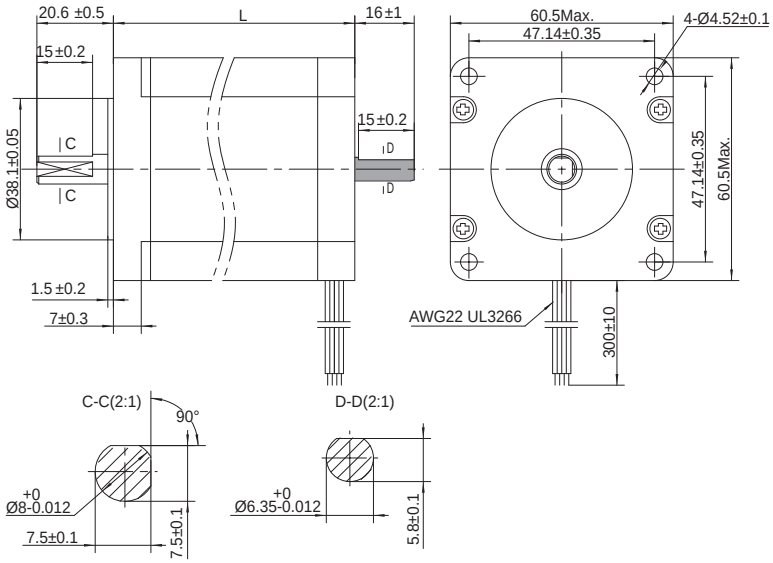






NEMA24 2-phase DC 1.8° - 24HS Series

Dimensions (Unit: mm)

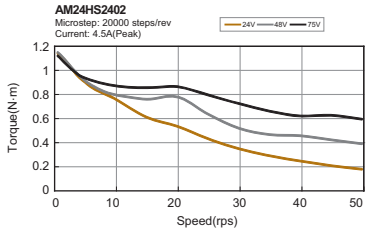


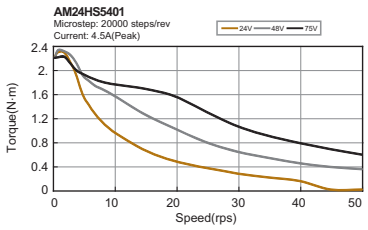
Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HS2402-08N	Single Shaft	A	4	54.0	1.2	4.5	0.43	450.0	0.83	500VAC 1 minute
AM24HS2402-11N	Double Shaft									
AM24HS5401-10N	Single Shaft			85.0	2.5	4.5	0.65	900.0	1.4	
AM24HS5401-24N	Double Shaft									

* Wiring Diagram A See Page 195

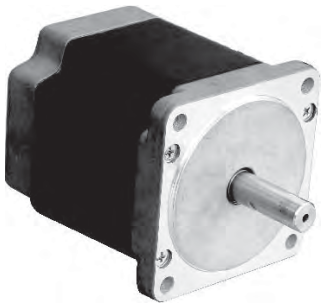
Torque Curves (Recommended Driver: SR or ST)

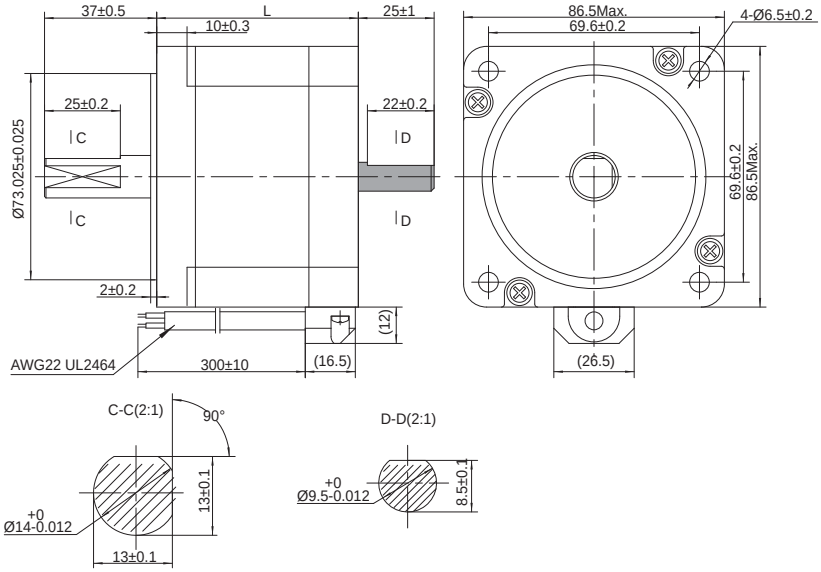




NEMA34 2-phase DC 1.8°- 34HD Series

Dimensions (Unit: mm)



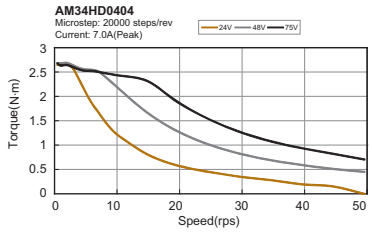


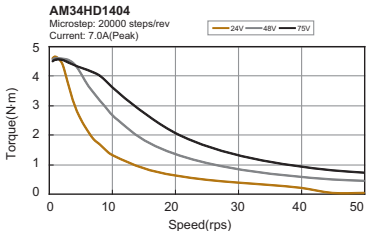
Parameters

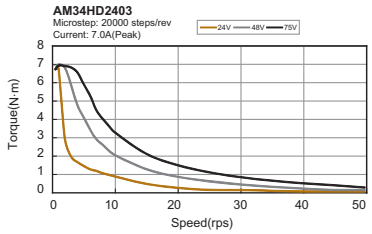
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HD0404-08	Single Shaft	A	4	66.5	3.0	7.0	0.24	1100.0	1.6	500VAC 1 minute
AM34HD0404-09	Double Shaft									
AM34HD1404-06	Single Shaft			96.0	5.0	7.0	0.33	1850.0	2.7	
AM34HD1404-07	Double Shaft									
AM34HD2403-07	Single Shaft			125.5	7.1	7.0	0.49	2750.0	3.8	
AM34HD2403-08	Double Shaft									

* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)

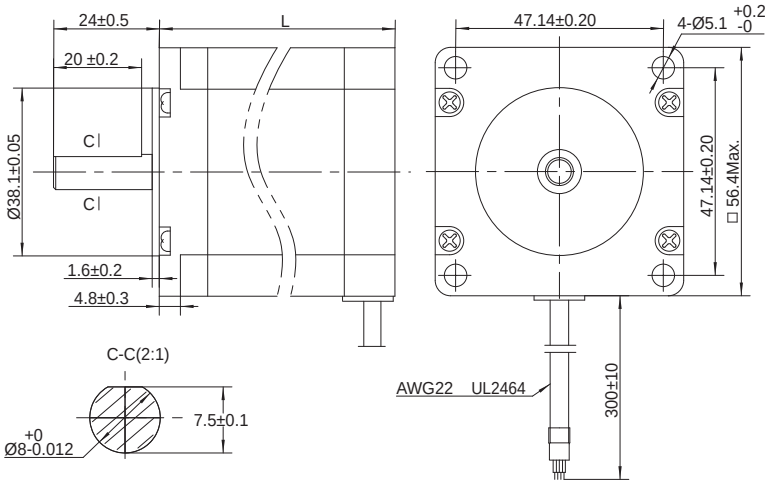






NEMA23 2-phase AC 1.8° - 23HS Series

Dimensions (Unit: mm)

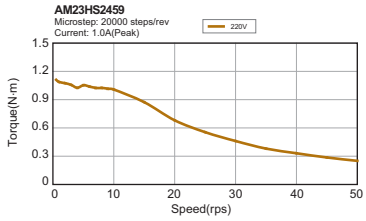


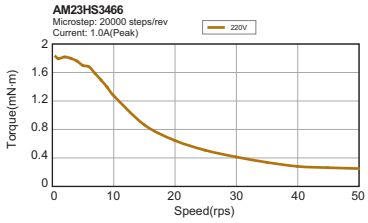
Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS2459-01	Single Shaft	A	4	54	1.1	1	16.6	260.0	0.6	1500VAC 1 minute
AM23HS3466-01				76	1.8		25.4	460.0	1.0	

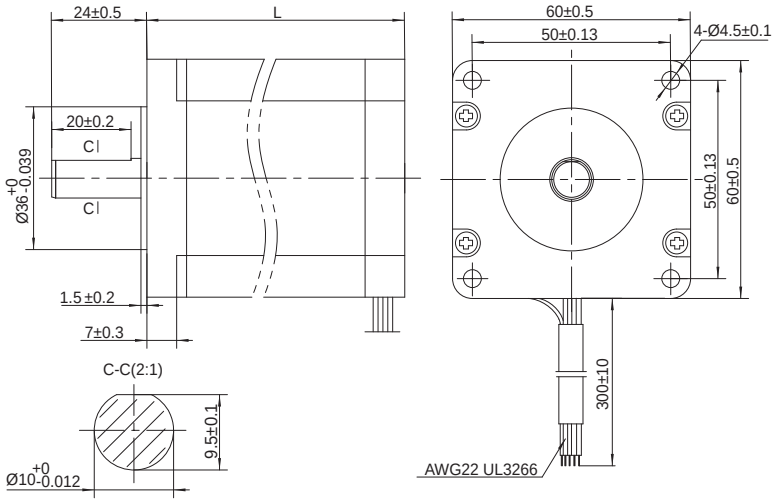
⋆ Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: STAC or SRAC)





Dimensions (Unit: mm)

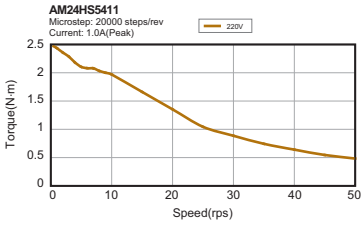


Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HS5411-01N	Single Shaft	A	4	85	2.5	1	15.4	900.0	1.4	1500VAC 1 minute

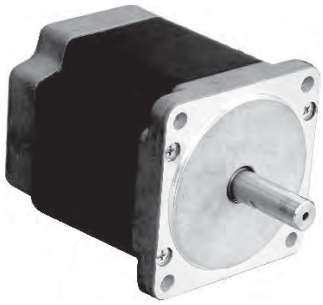
* Wiring Diagram A See Page 195

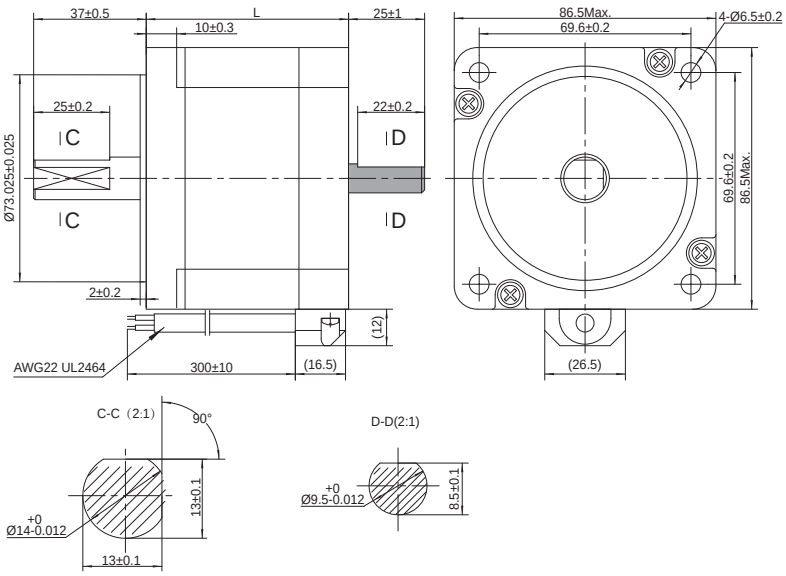
Torque Curves (Recommended Driver: STAC or SRAC)



NEMA34 2-phase AC 1.8° - 34HD Series

Dimensions (Unit: mm)



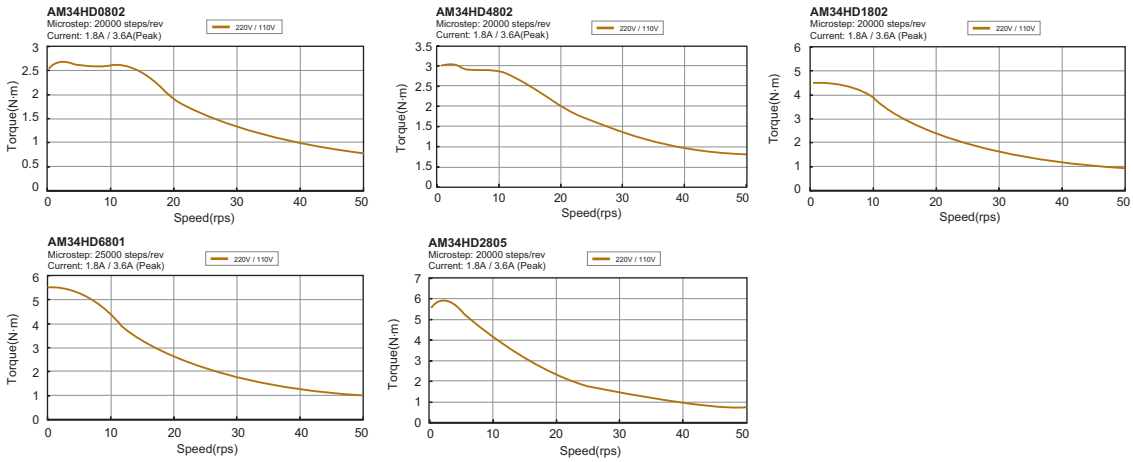


Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HD0802-01	Single Shaft	C	8	66.5	3	1.8	3.4	1100.0	1.6	1500VAC 1 minute
AM34HD0802-02	Double Shaft									
AM34HD4802-01	Single Shaft			75	3.5		3.6	1350.0	1.9	
AM34HD1802-01	Single Shaft			96	5		3.6	1850.0	2.7	
AM34HD1802-03	Double Shaft									
AM34HD6801-01	Single Shaft			115	6.5		4	2400.0	3.5	
AM34HD2805-01	Single Shaft			125.5	7.1		4.2	2750.0	3.8	
AM34HD2805-03	Double Shaft									

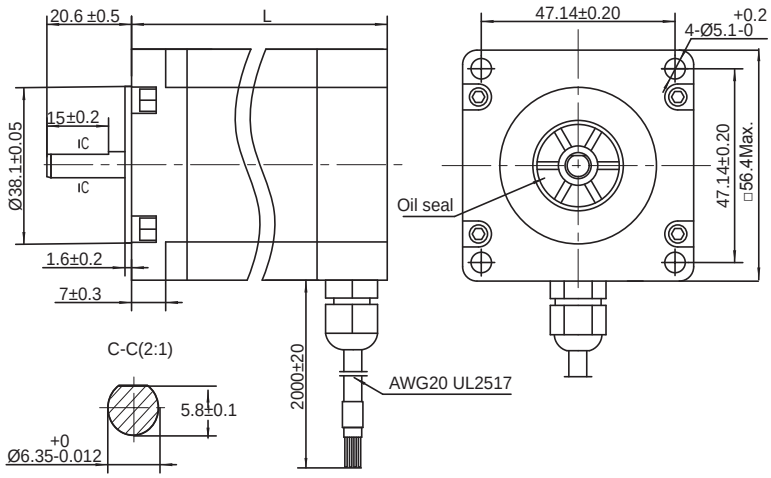
* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: STAC or SRAC)



NEMA23 2-phase DC 1.8°- 23HS Series IP65 Type

Dimensions (Unit: mm)

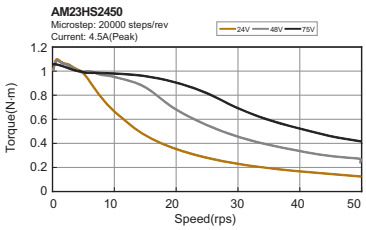


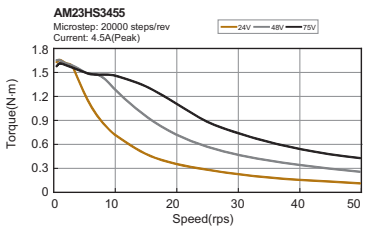
Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS2450-03	Single Shaft	A	4	61.7	1.2	4.5	0.63	260.0	0.6	500VAC 1 minute
AM23HS3455-05				83.7	1.8		0.75	460.0	1	

⋆ Wiring Diagram A See Page 195

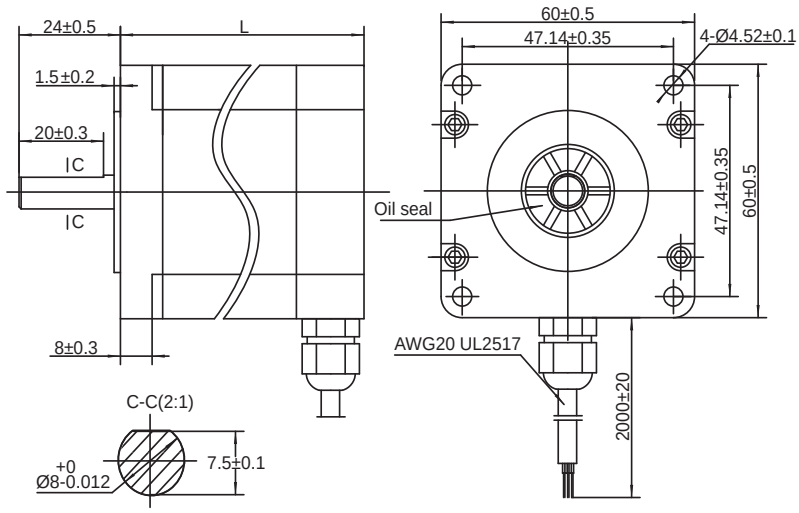
Torque Curves (Recommended Driver: SR or ST)





NEMA24 2-phase DC 1.8° - 24HS Series IP65 Type

Dimensions (Unit: mm)

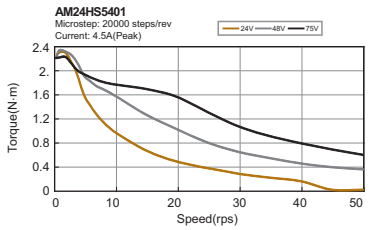


Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HS5401-44N	Single Shaft	A	4	94.5	2.5	4.5	0.65	900.0	1.4	500VAC 1 minute

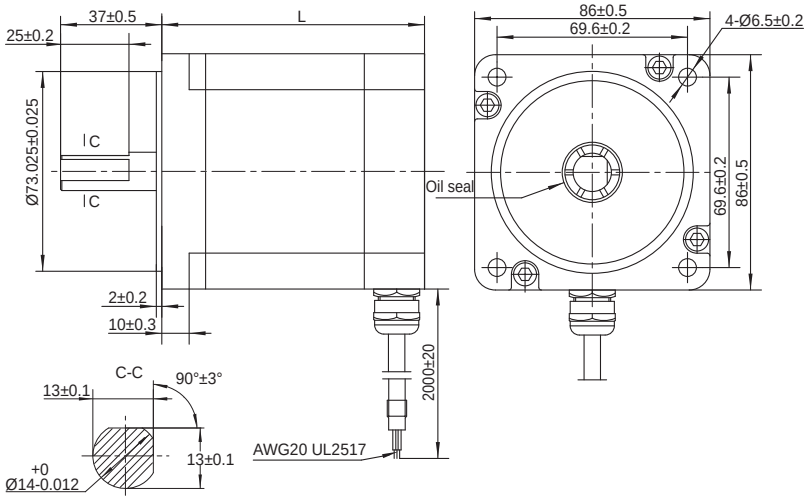
* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)



NEMA34 2-phase DC 1.8°-34HD Series IP65 Type

Dimensions (Unit: mm)

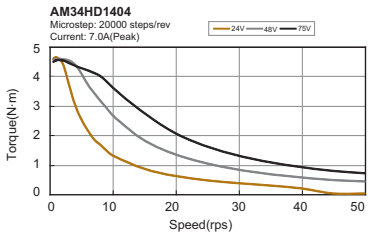


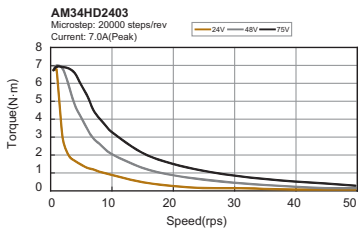
Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HD1404-13	Single Shaft	A	4	98	5	7	0.33	1850.0	2.7	500VAC 1 minute
AM34HD2403-13				127.5	7.1		0.49	2750.0	3.8	

* Wiring Diagram A See Page 195

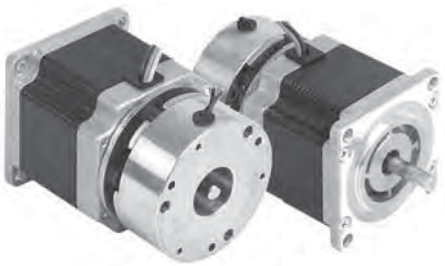
Torque Curves (Recommended Driver: SR or ST)

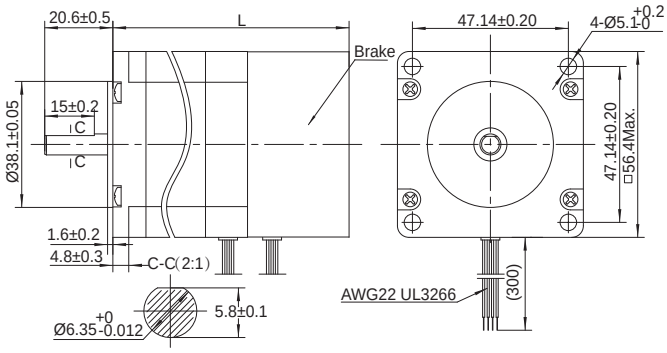




NEMA23 2-phase DC 1.8°- 23HS Series Brake type

Dimensions (Unit: mm)



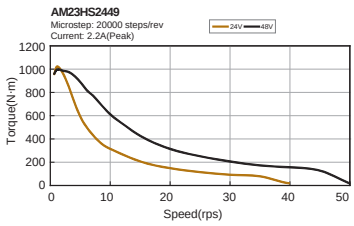


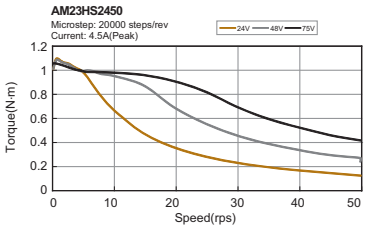
Parameters

Model	Shaft	Wiring	Leads	Length "L"	Holding Torque	Current	Resistance	Rotor Inertia	Holding Torque	Brake power	Motor Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V	Kg	
AM23HS2449-B24	Single Shaft	A	4	84.7	1.2	2.2	2.4	260.0	1.3	24	0.8	500VAC 1 minute
AM23HS2450-B24				84.7	1.2	4.5	0.63	460.0	1.3	24	0.8	

⋆ Wiring Diagram A See Page 195

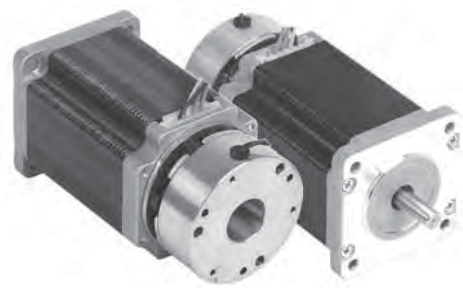
Torque Curves

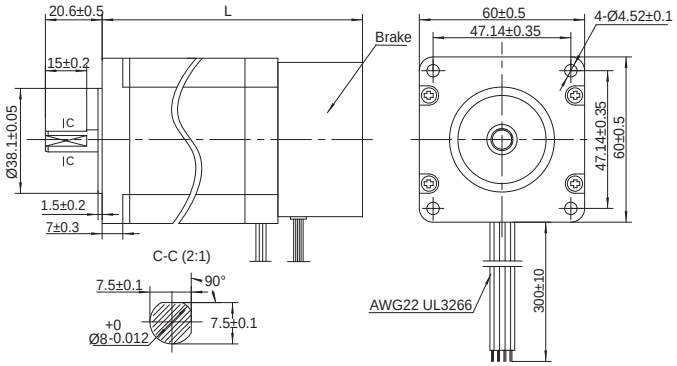




NEMA24 2-phase DC 1.8°- 24HS Series Brake type

Dimensions (Unit: mm)



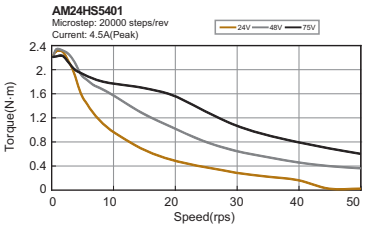


Parameters

Model	Shaft	Wiring	Leads	Length "L"	Holding Torque	Current	Resistance	Rotor Inertia	Holding Torque	Brake power	Motor Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V	Kg	
AM24HS5401-B24	Single Shaft	A	4	117.5	2.5	4.5	0.65	900.0	1.3	24	1.6	500VAC 1 minute

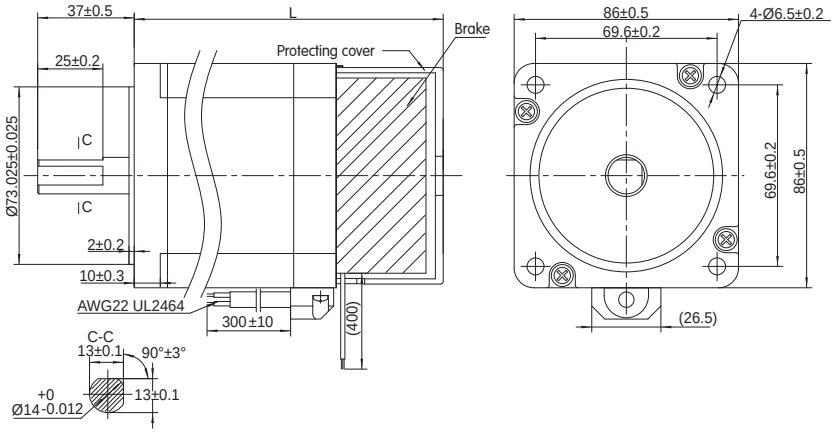
⋆ Wiring Diagram A See Page 195

Torque Curves



NEMA34 2-phase AC 1.8°-34HD Series Brake type

Dimensions (Unit: mm)

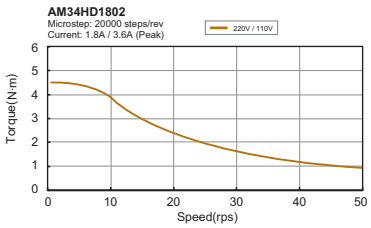


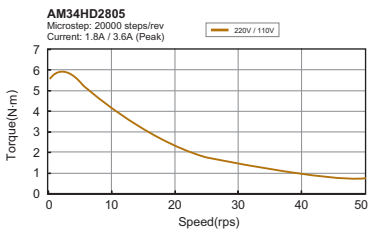
Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Holding Torque	Brake power	Motor Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V	Kg	
AM34HD1802-B24	Single Shaft	A	4	137	5	1.8	3.6	1850.0	4	24	3.2	1500VAC 1 minute
AM34HD2805-B24				166.5	7.1	1.8	4.2	2750.0	4	24	4.3	

* Wiring Diagram A See Page 195

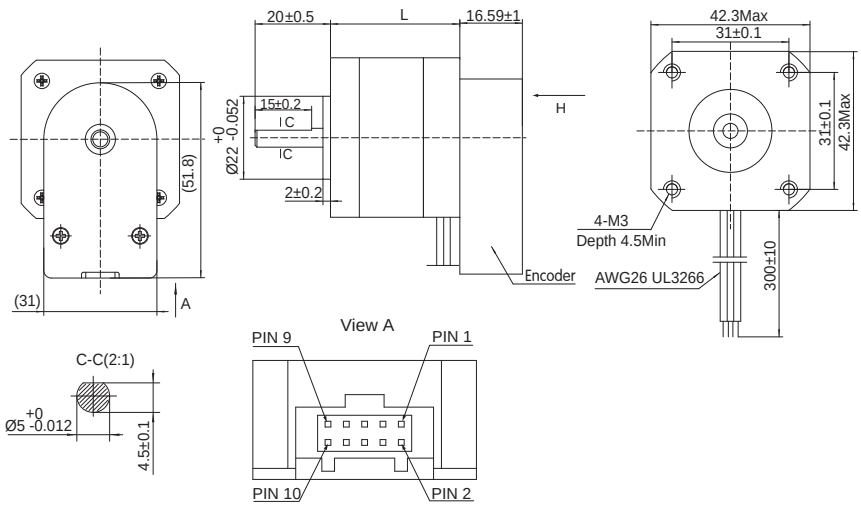
Torque Curves (Recommended Driver: STAC or SRAC)





NEMA17 2-phase DC 1.8°- 17HD Series Encoder Type

Dimensions (Unit: mm)



Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700

Pin.	1	2	3	4	5
Signal	NC	Ground	Index-	Index+	A-
Pin.	**6**	**7**	**8**	**9**	**10**
Signal	A+	+5V DC	NC	B-	B+

Accessories(Sold Separately)

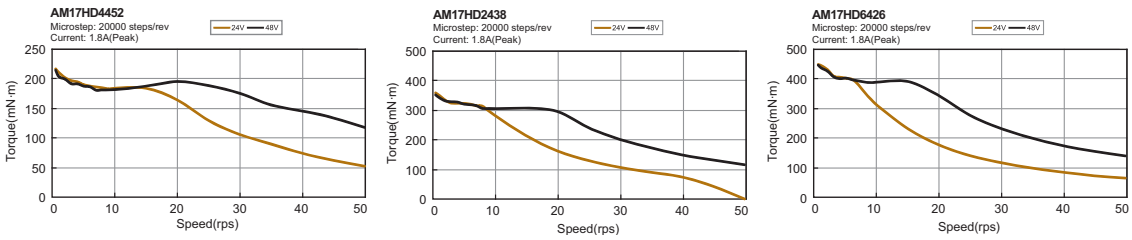
General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

Parameters

Model	Wiring	Leads	Length "L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass
			mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg
AM17HD4452-E1000D	A	4	34.3	0.25	1.8	1.5	38.0	0.23
AM17HD2438-E1000D			39.8	0.4	1.8	1.9	57.0	0.28
AM17HD6426-E1000D			48.3	0.5	1.8	2.3	82.0	0.36

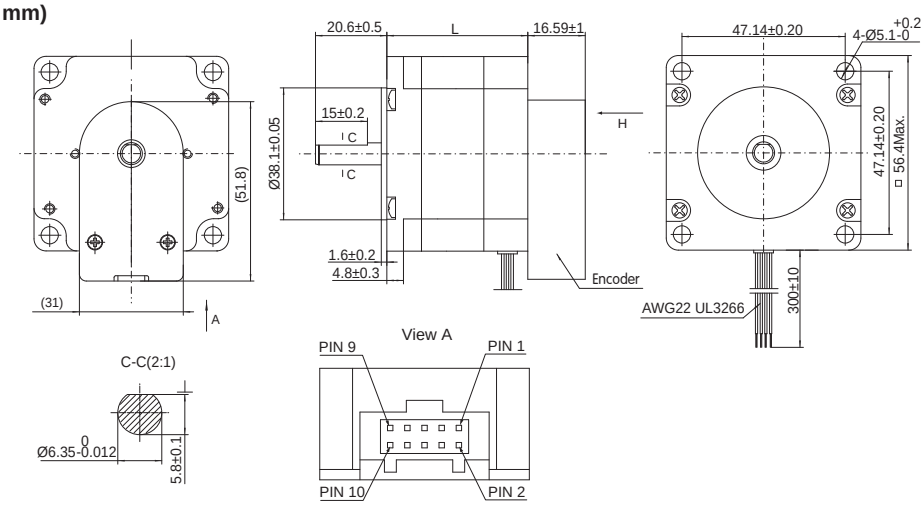
* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)



NEMA23 2-phase DC 1.8°- 23HS Series Encoder Type

Dimensions (Unit: mm)



Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700

Pin.	1	2	3	4	5
Signal	NC	Ground	Index-	Index+	A-
Pin.	**6**	**7**	**8**	**9**	**10**
Signal	A+	+5V DC	NC	B-	B+

Accessories(Sold Separately)

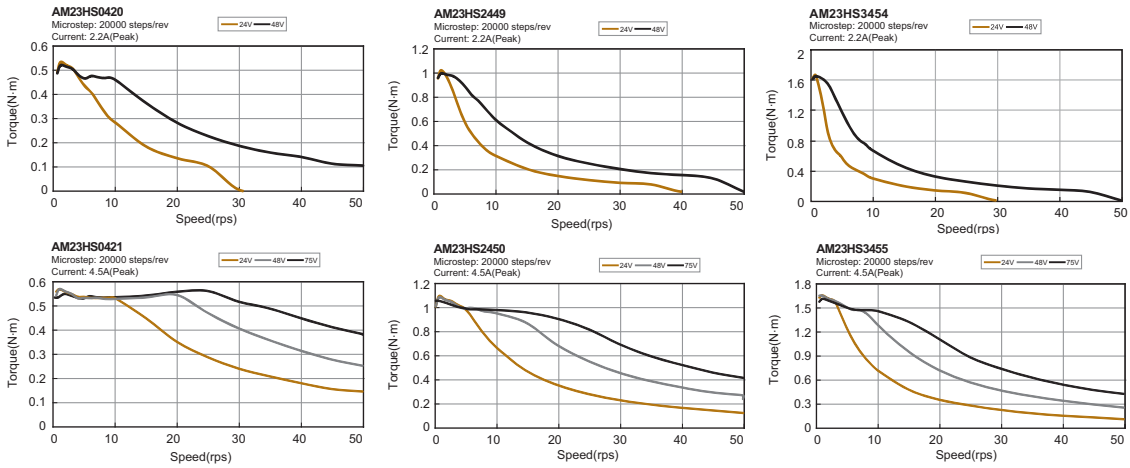
General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

Parameters

Model	Wiring	Leads	Length "L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass
			mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg
AM23HS0420-E1000D	A	4	41.0	0.6	2.2	1.8	135.0	0.42
AM23HS2449-E1000D			54.0	1.2	2.2	2.4	260.0	0.6
AM23HS3454-E1000D			76.0	1.8	2.2	2.9	460.0	1.0
AM23HS0421-E1000D			41.0	0.6	4.5	0.48	135.0	0.42
AM23HS2450-E1000D			54.0	1.2	4.5	0.63	260.0	0.6
AM23HS3455-E1000D			76.0	1.8	4.5	0.75	460.0	1.0

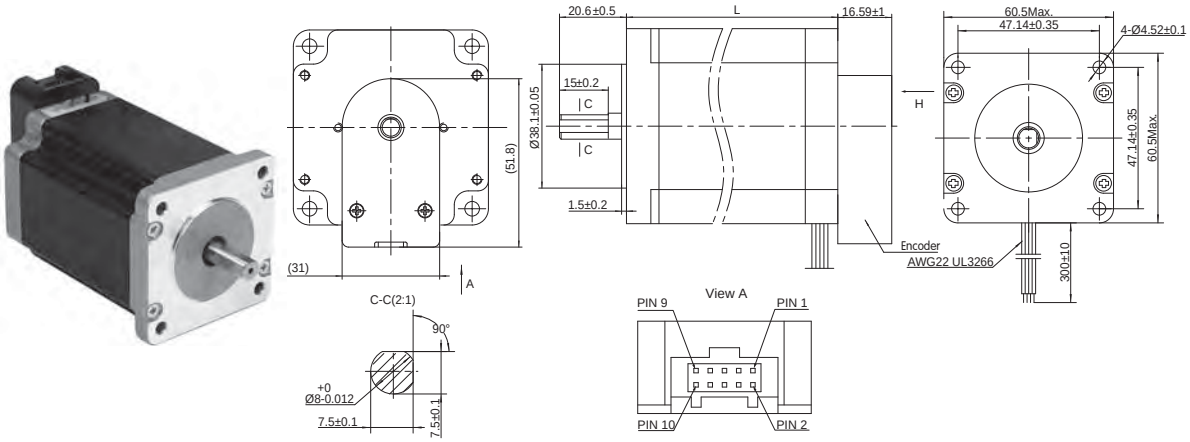
* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)



NEMA24 2-phase DC 1.8°- 24HS Series Encoder Type

Dimensions (Unit: mm)



Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700

Pin.	1	2	3	4	5
Signal	NC	Ground	Index-	Index+	A-
Pin.	**6**	**7**	**8**	**9**	**10**
Signal	A+	+5V DC	NC	B-	B+

Accessories(Sold Separately)

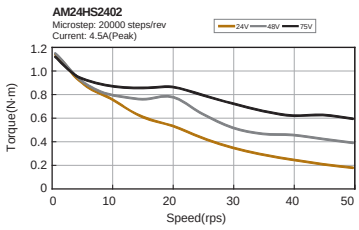
General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

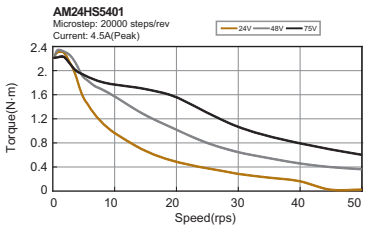
Parameters

Model	Wiring	Leads	Length "L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass
			mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg
AM24HS2402-E1000D	A	4	54.0	1.2	4.5	0.43	450.0	0.83
AM24HS5401-E1000D			85.0	2.5	4.5	0.65	900.0	1.4

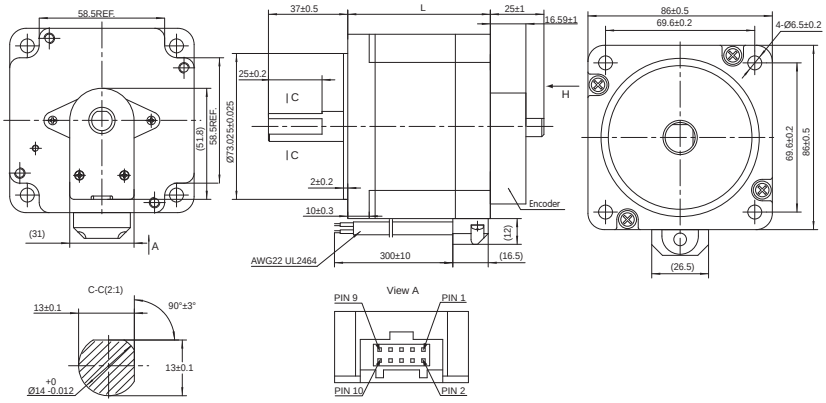
* Wiring Diagram A See Page 195

Torque Curves (Recommended Driver: SR or ST)





Dimensions (Unit: mm)



Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700

Pin.	1	2	3	4	5
Signal	NC	Ground	Index-	Index+	A-
Pin.	**6**	**7**	**8**	**9**	**10**
Signal	A+	+5V DC	NC	B-	B+

Accessories(Sold Separately)

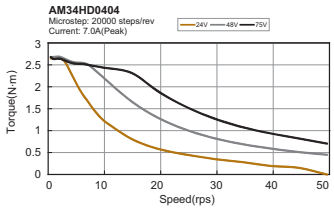
General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

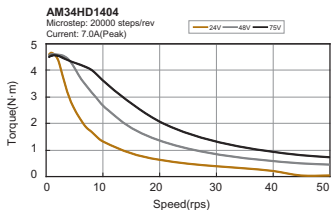
Parameters

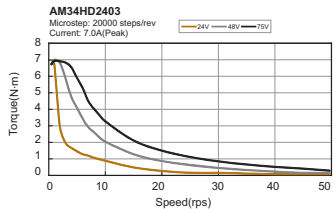
Model	Wiring	Leads	Length"L"	Holding Torque	Current(A/Phase)	Resistance (Ω/Phase)	Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m			g·cm²	Kg	
AM34HD0404-E1000D	A	4	66.5	3.0	7.0	0.24	1100.0	1.6	500VAC 1 minute
AM34HD1404-E1000D			96.0	5.0	7.0	0.33	1850.0	2.7	
AM34HD2403-E1000D			125.5	7.1	7.0	0.49	2750.0	3.8	

* Wiring Diagram A.B.C See Page 195

Torque Curves (Recommended Driver: SR or ST)





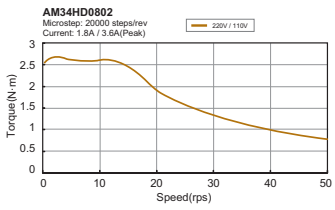


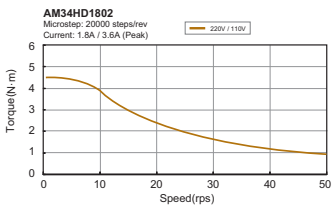
Parameters

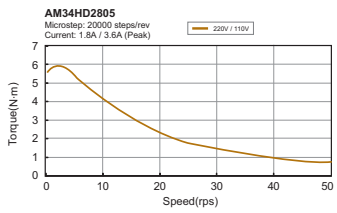
Model	Wiring	Leads	Length"L"	Holding Torque	Current(A/Phase)		Resistance (Ω/Phase)		Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m	Series	Parallel	Series	Parallel	g·cm²	Kg	
AM34HD0802-E1000D	B(Parallel) C(Series)	8	66.5	3.0	1.8(When drive by 220VAC)	3.6(When drive by 110VAC)	3.4	0.9	1100.0	1.6	1500VAC 1 minute
AM34HD1802-E1000D			96.0	5.0			3.6	0.9	1850.0	2.7	
AM34HD2805-E1000D			125.5	7.1			4.2	1.1	2750.0	3.8	

* Wiring Diagram A.B.C See Page 195

Torque Curves (Recommended Driver: STAC or SRAC)

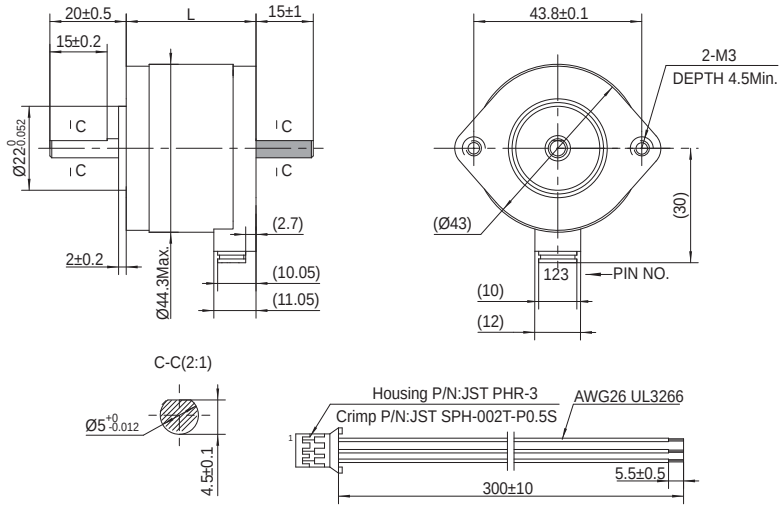






NEMA17 3-phase DC1.2°- 17HC Series

Dimensions (Unit: mm)



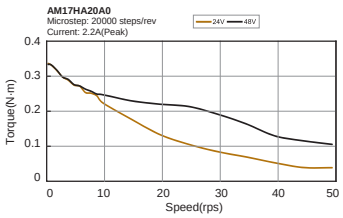
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

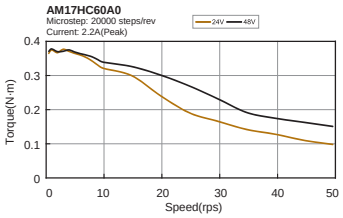
Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM17HC20A0-01N	Single Shaft	D	3	34	0.4	2.2	3.9	57.0	0.25	500VAC 1 minute
AM17HC20A0-02N	Double Shaft									
AM17HC60A0-01N	Single Shaft			43	0.52	2.2	5	82.0	0.35	
AM17HC60A0-02N	Double Shaft									

* Wiring Diagram A See Page 195

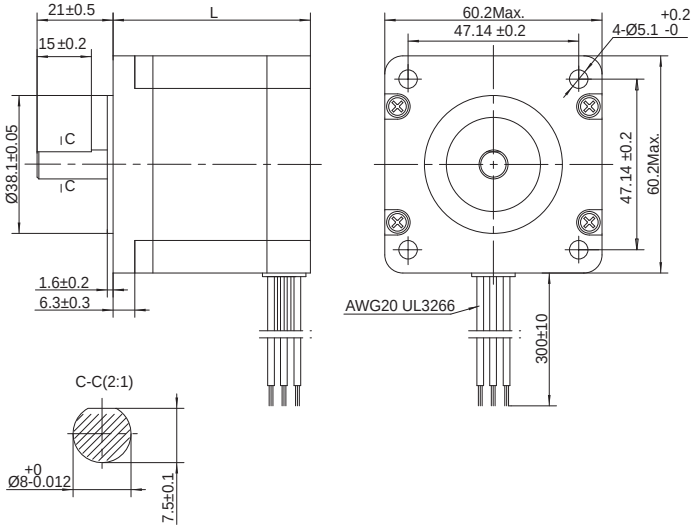
Torque Curves (Recommended Driver: 3SR or 3ST)





NEMA24 3-phase DC1.2°- 24HC Series 57 Flange

Dimensions (Unit: mm)

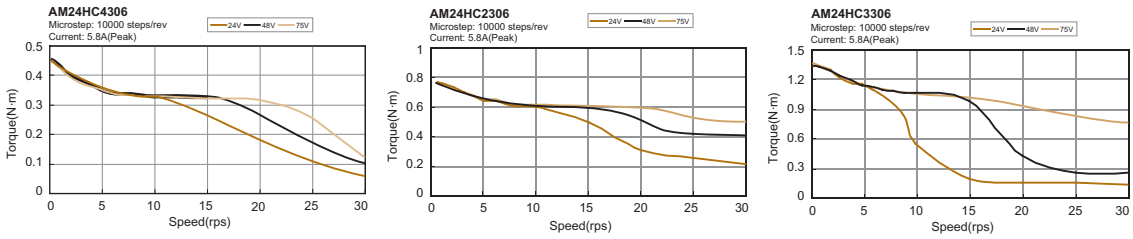


Parameters

Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm^2	Kg	
AM24HC4306-01	Single Shaft	D	3	45.5	0.5	5.8	0.33	180.0	0.5	500VAC 1 minute
AM24HC2306-01				54.5	0.9		0.4	260.0	0.8	
AM24HC3306-03				76.5	1.5		0.63	460.0	1.3	

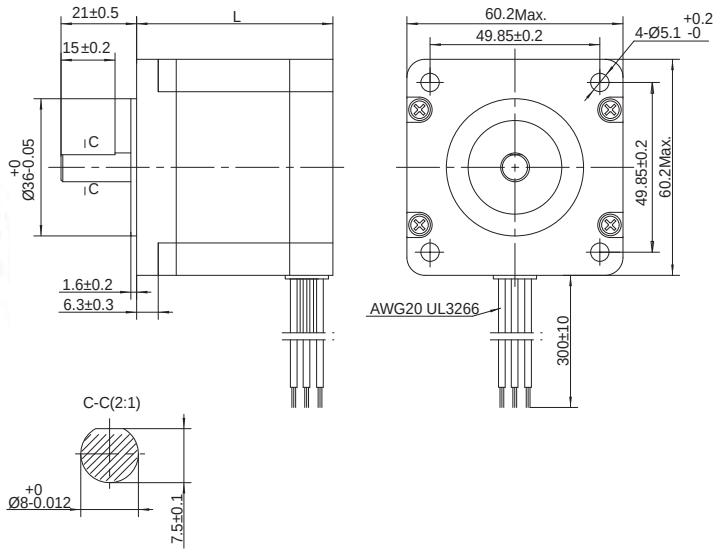
* Wiring Diagram D See Page 195

Torque Curves (Recommended Driver: 3SR or 3ST)



NEMA24 3-Phase DC1.2° - 24HC Series 60 Flange

Dimensions (Unit: mm)

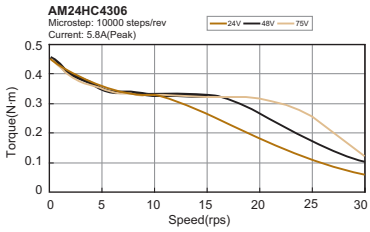


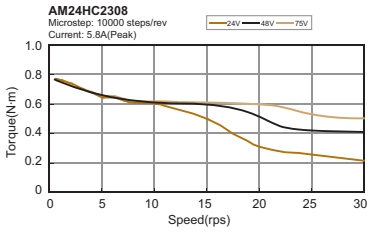
Parameters

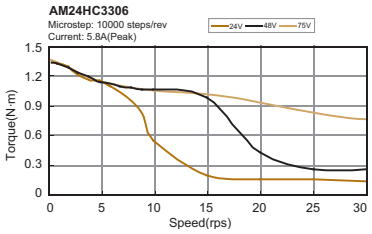
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HC4306-03	Single Shaft	D	3	45.5	0.5	5.8	0.33	180.0	0.5	500VAC 1 minute
AM24HC2308-02				54.5	0.9		0.4	260.0	0.8	
AM24HC3306-07				76.5	1.5		0.63	460.0	1.3	

⋆ Wiring Diagram D See Page 195

Torque Curves (Recommended Driver: 3SR or 3ST)

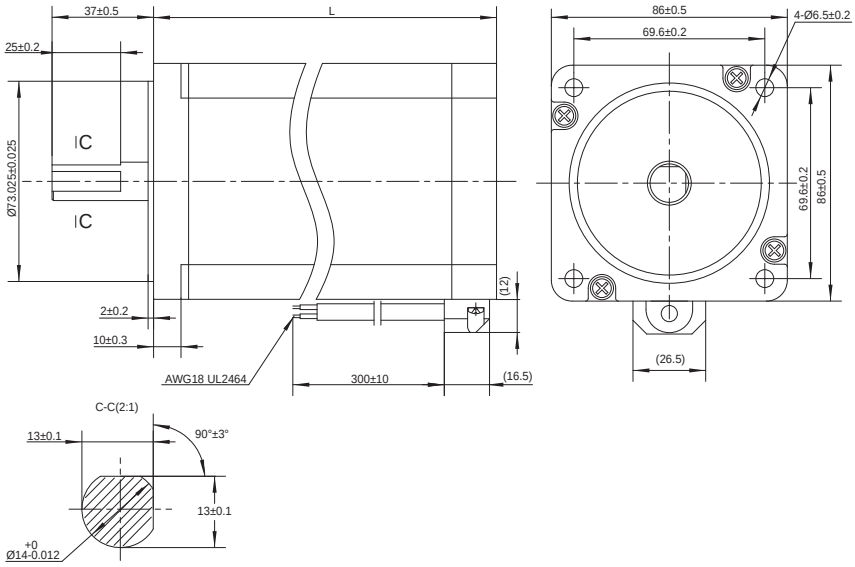






NEMA34 3-phase DC1.2°- 34HC Series

Dimensions (Unit: mm)

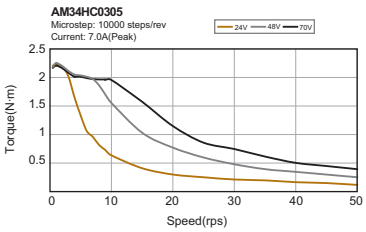


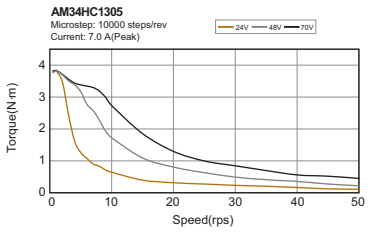
Parameters

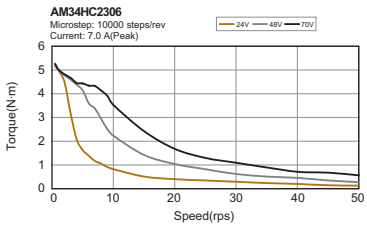
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HC0305-01	Single Shaft	D	3	66.5	2.5	7.0	0.53	1100.0	1.6	500VAC 1 minute
AM34HC1305-01				96	4	7.0	0.58	1850.0	2.7	
AM34HC2306-01				125.5	5.5	7.0	0.9	2750.0	3.8	

* Wiring Diagram D See Page 195

Torque Curves (Recommended Driver: 3SR or 3ST)

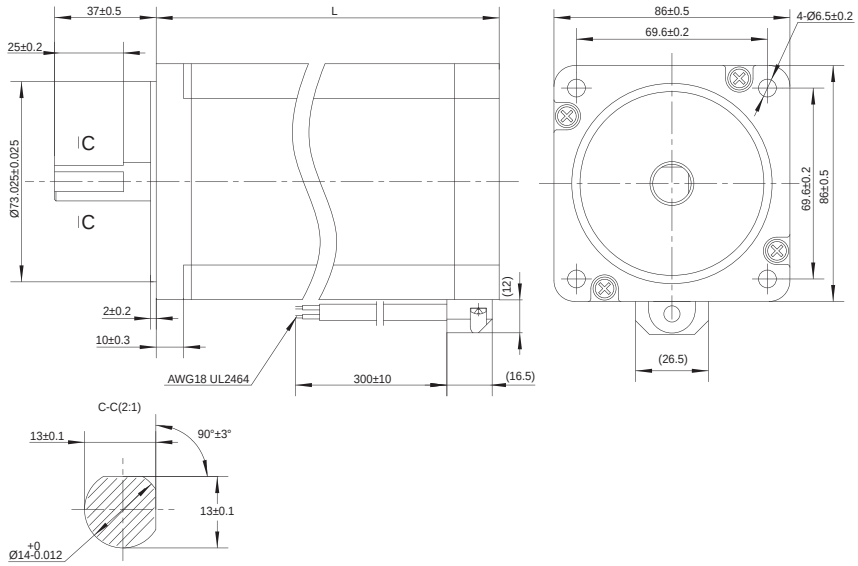






NEMA34 3-phase AC1.2°- 34HC Series

Dimensions (Unit: mm)

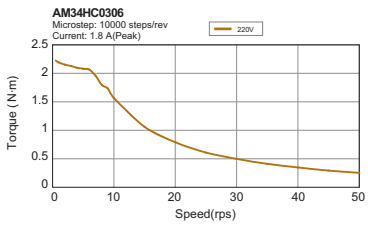


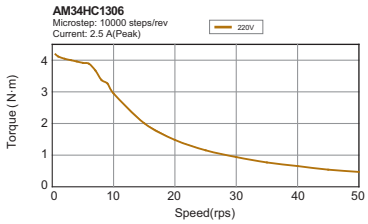
Parameters

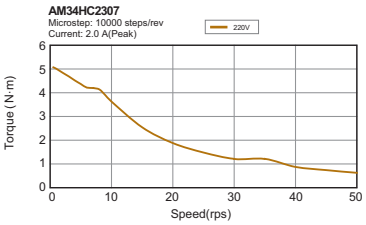
Model	Shaft	Wiring	Leads	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HC0306-01	Single Shaft	D	3	66.5	2.5	1.5	12.8	1100.0	1.6	1500VAC 1 minute
AM34HC1306-01				96	5	2.5	7	1850.0	2.7	
AM34HC2307-01				125.5	5.5	2	6	2750.0	3.8	

⋆ Wiring Diagram D See Page 195

Torque Curves (Recommended Driver: 3SRAC)





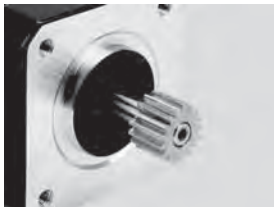


Configurations and Options

Besides all standard motors above, we also provide all kinds of customized motors per request.

Shaft Configuration


Cross Drilled Shaft

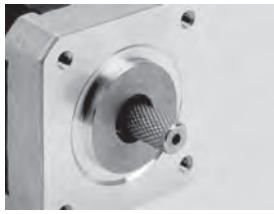

Gear


Plastic Pulley


Single Flat


Double Flat


Key Way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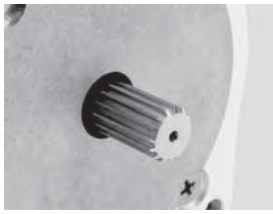
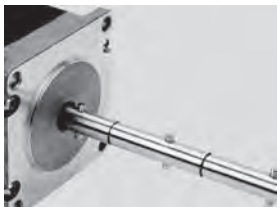

Hobbed Gear

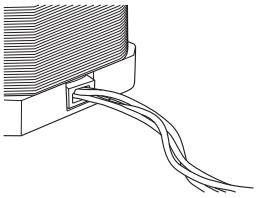

Screw Hollow Shaft

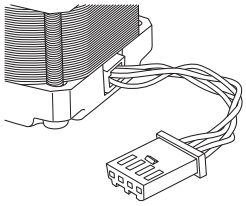

Dowel

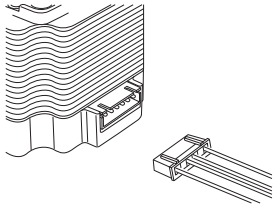

Worm Shaft


Hollow Shaft

Connection Configuration


Lead Wire


Lead Wire with Connector


Connector with harness

Encoder Option

Gearbox Option

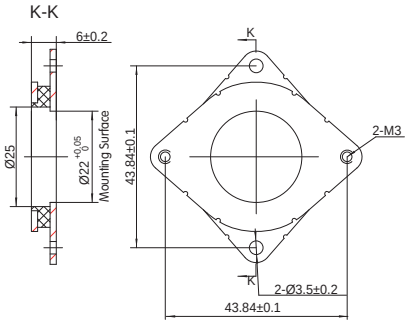
Brake Option

Integrated

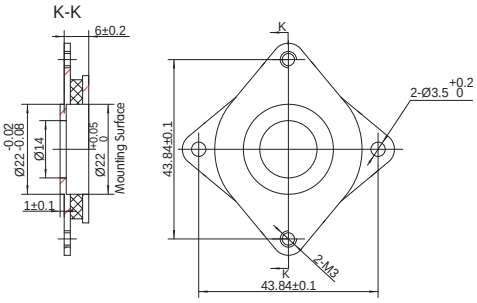
Accessory

42 Flange Demension	Model	Application of screw	Maximum Load	Scope Of Application
	AMJZ17-01	M3(2X)	490N(50kgf)	NEMA17
	AMJZ17-02		490N(50kgf)	NEMA17

AMJZ17-01

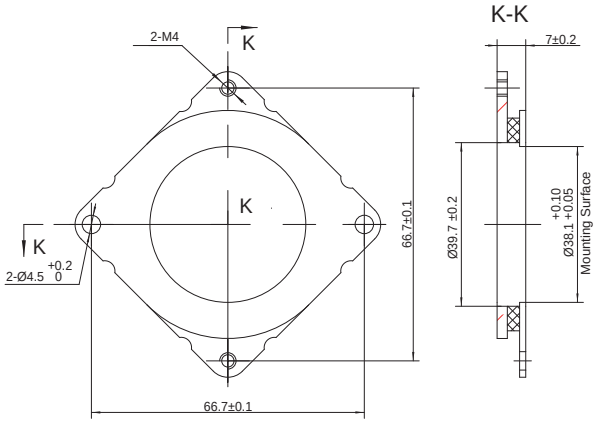


AMJZ17-02

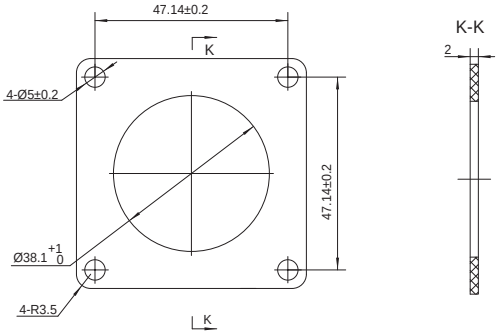


60 Flange Demension	Model	Application of screw	Maximum Load	Scope Of Application
	AMJZ23-01	M4(2X)	490N(50kgf)	NEMA23/NEMA24(2-phase)
	AMJZ23-02		490N(50kgf)	NEMA23/NEMA24(2-phase)

AMJZ23-01



AMJZ23-02



Instructions for use: reducing mechanical noise

Accessories Appendix

MF150A Series

Features

- universal AC input / full range: 85-264VAC or 120-370VDC
- active PFC filter build-in, PF>0.95, compliance to EN61000-3-2
- safety: UL / TUV / CB / CE
- protections: short circuit, overload, over voltage; over temp. (optional)
- LED indicator for power on
- 3.3V to 48V output voltage multi-species, the voltage is manually adjustable
- teminal block: vertical terminal / horizontal terminal / connector modes available (vertical terminal is standard)
- peak current for motor applications: models 24V, 27V, 36V, 48V (optional)
- remote ON/OFF control (optional)
- 100% full load burn-in test
- compact size, high performance, high reliability
- RoHS compliant
- 2-year warranty

single output
170 × 99 × 50 mm

Technical Specifications

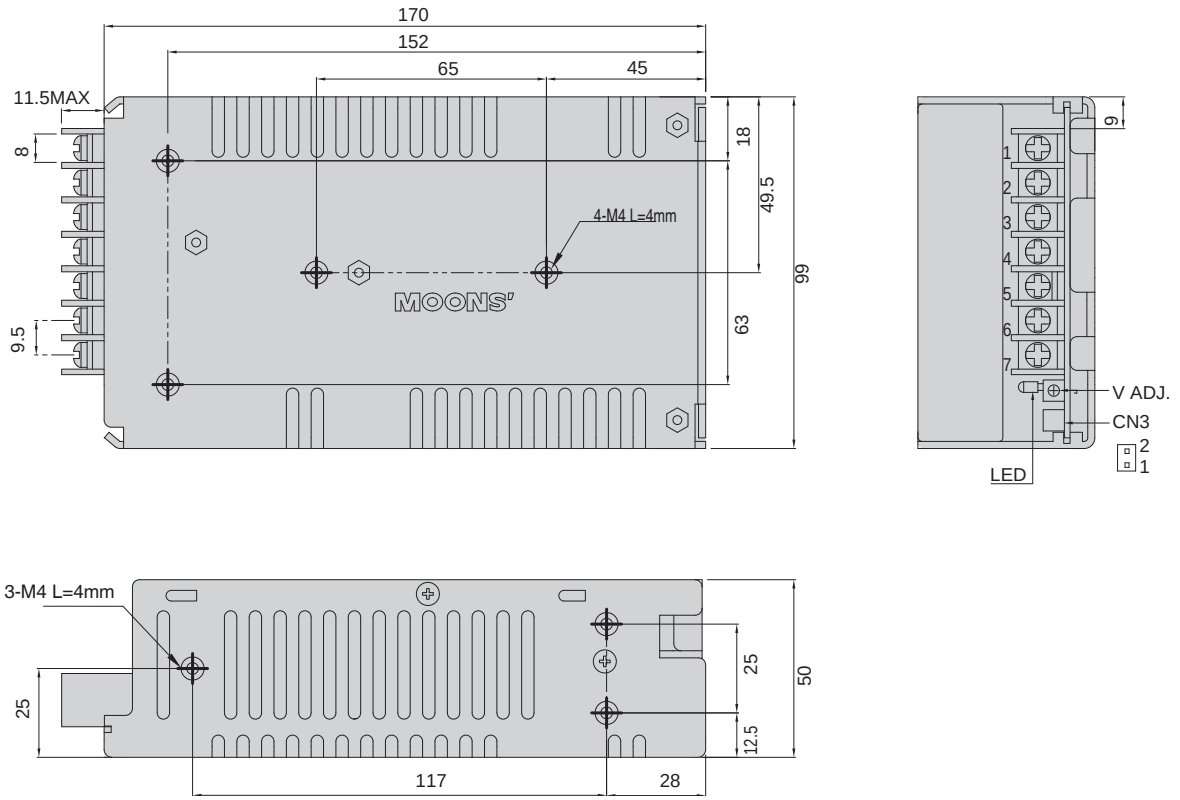
	MF150A 24AG		MF150A 48AG	
rated output voltage	24 V		48 V	
output current range	0~6.3 A		0~3.2 A	
peak output current (optional)	9.5 A		4.8 A	
rated output power	151 W		154 W	
routput voltage adj. range*1	21.6~26.4 V		43.2~52.8 V	
ripple & noise (p-p)*1, *2	150 mV		240 mV	
line regulation*2	96 mV		150 mV	
load regulation*2	120 mV		120 mV	
Output Voltage Tolerance *2	±1 %			
hold-up time (typical)*1	16ms / 20ms			
input voltage range	85 ~ 264 VAC (47-63Hz) or 120 ~ 370 VDC			
input current (typical)*1	1.8A / 0.9A			
inrush current (typical)	20A / 40A (cold start)			
power factor (typical)	0.99 / 0.95			
efficiency (typical)*1	76% / 79%	81% / 84%	81% / 84%	83% / 86%
leakage current (typical)*1	0.25mA / 0.5mA (MAX 0.75mA)			
over current protection*3	105% - 150%			
over voltage protection*4	5.75~6.95 V	13.8~16.2 V	27.6~32.4 V	55.2~64.8 V
temperature coefficient	< 0.02% /°C			
operating temperature	- 20 ~ + 70°C (refer to output derating curve)			
operating humidity	20 ~ 90 %RH (non-condensing)			
storage temperature	- 30 ~ +85°C			
storage humidity	10 ~ 95%RH (non-condensing)			
cooling method	cooling by free air convection / external colling fan			
withstand voltage	input / output: 3.0kVAC (20mA); input / FG: 2.0kVAC (20mA); output / FG : 500VAC (20mA) , 1 minute			
isolation resistance	>100 MΩ output / FG: 500VDC Ta=25°C and 70%RH			
vibration	10 - 55Hz, 10min. 1 cycle, 2G constant, X, Y, Z axes 1 hour each			
safety standards	UL60950-1, CSA60950-1, EN60950-1, GB4943			
EMI conduction & radiation*5	compliance to FCC-Class B, EN55011/EN55022-B, CISPR22 Class B			
EMS immunity*5	compliance to EN61000-4-2,3,4,5,6,8,11			
optional function	remote ON/OFF control, peak current output, over-temperature protection			
weight (typical)	620 g			
dimension	170×99×50 mm (L×W×H)			

Note:

*1 All parameters not specially mentioned are measured at 115/230VAC input, rated load and 25°C of ambient temperature.
*2 Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
*3 OCP type: constant current limiting, recovers automatically after fault condition is removed (hiccup mode customizable)
*4 OVP type: shutdown output voltage, re-power on to recover.
*5 The power supply is considered as a component to be installed into a final equipment which should be re-confirmed to meets EMC directives.

Mechanical Outline (unit: mm)

Model: MF150A



- Terminal Pin No. Assignment

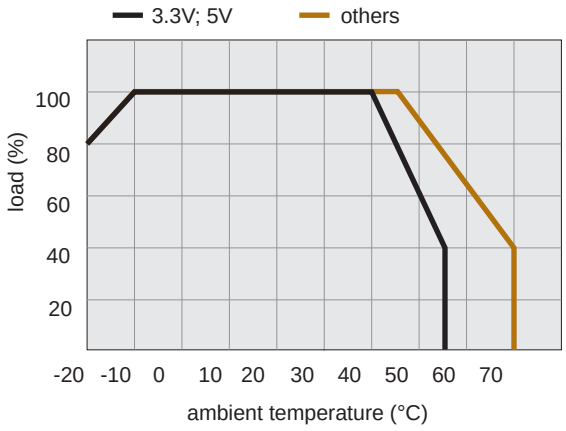
pin no.	assignment
1	AC input / L
2	AC input / N
3	FG ⏚
4,5	DC output - V
6,7	DC output +V

- CN3: JST S2B-XH or equivalent (optional)

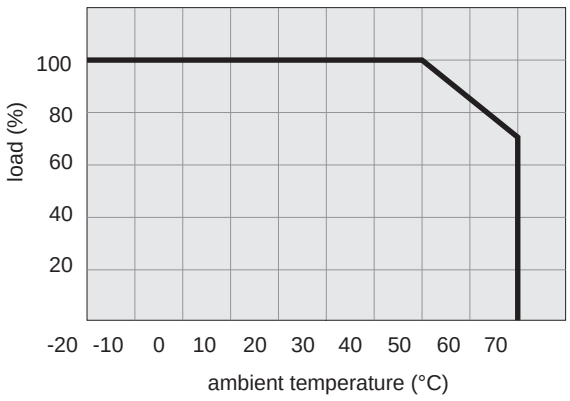
pin no.	assignment	matching conn.	maching pin.
1	RC+	JST XHP or equivalent	JST SXH-001T-P0.6 or equivalent
2	RC-		

Derating Curve

- convection



- force-air cooling (at 18 CFM or 1.2 m/s)



MF320A Series

Features

- universal AC input / full range: 85-264VAC or 120-370VDC
- active PFC filter build-in, PF>0.95, compliance to EN61000-3-2
- safety: UL / TUV / CB / CE
- protections: short circuit, overload, over voltage, over temperature
- LED indicator for power on
- universal output voltage range: 5V to 48V output voltage multi-species, the voltage is manually adjustable
- teminal block: vertical terminal / horizontal terminal / connector modes available (vertical terminal is standard)
- peak current for motor applications: models 24V, 27V, 30V, 36V, 48V (optional)
- remote ON/OFF control (optional)
- 100% full load burn-in test
- compact size, high performance, high reliability
- RoHS compliant
- 2-year warranty

single output
199 × 99 × 52mm

Technical Specifications

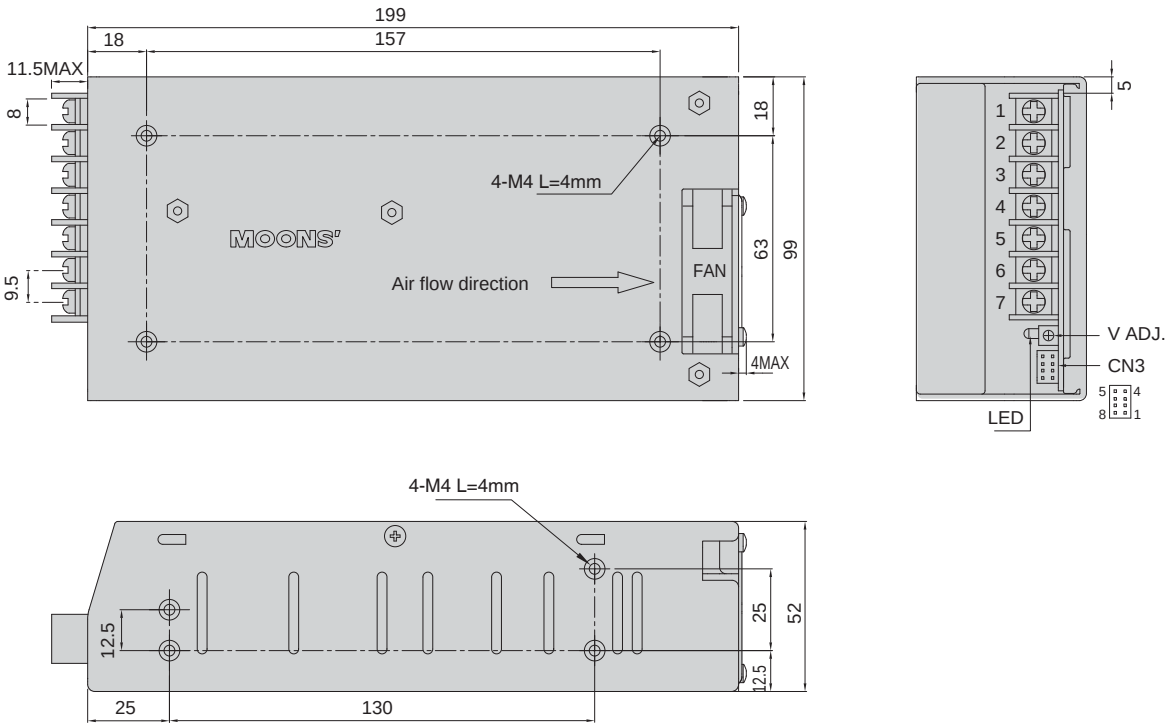
	MF320A 24AG		MF320A 48AG	
rated output voltage	24 V		48 V	
output current range	0~13 A		0~6.7 A	
peak output current(optional)	17.3 A		8.7 A	
rated output power	312 W		321 W	
output voltage adj. range*1	21.6~26.4 V		43.2~52.8 V	
ripple & noise (p-p)*1, *2	150 mV		240 mV	
line regulation*2	48 mV		96 mV	
load regulation*2	120 mV		240 mV	
Output Voltage Tolerance *2	±1 %			
hold-up time (typical)*1	16ms / 20ms			
input voltage range	85 ~ 264 VAC (47-63Hz) or 120 ~ 370 VDC			
input current (typical)*1	3.2A / 1.6A	3.6A / 1.8A		
inrush current (typical)*1	20A / 40A (cold start)			
power factor (typical)*1	0.99 / 0.95			
efficiency (typical)*1	74% / 78%	82% / 86%		83% / 87%
leakage current (typical)*1	0.25mA / 0.5mA (MAX 0.75)			
over current protection*3	105% - 150%			
over voltage protection*4	5.75~6.95 V	13.8~16.2 V	27.6~32.4 V	55.2~64.8 V
over temp. protection*4	90°C±5 (detect on heatsink of power transistor)			
temperature coefficient	< 0.02% /°C (0-50°C)			
operating temperature	- 20 ~ + 70°C (refer to output derating curve)			
operating humidity	20 ~ 90%RH (non-condensing)			
storage temperature	- 30 ~ +85°C			
storage humidity	10 ~ 95%RH (non-condensing)			
cooling method	built-in DC fan			
withstand voltage	input / output: 3.0kVAC (10mA); input / FG: 2.0kVAC (10mA); output / FG: 500VAC (10mA), 1 minute			
isolation resistance	>100MΩ output / FG:500VDC Ta=25°C and 70%RH			
vibration	10 - 55Hz, 10min. 1 cycle, 2G constant, X, Y, Z axes 1 hour each			
safety standards	UL60950-1, CSA60950-1, EN60950-1, GB4943			
EMI conduction & radiation*5	compliance to FCC-Class B, EN55011/EN55022-B, CISPR22 Class B			
EMC immunity*5	compliance to EN61000-4-2,3,4,5,6,8,11			
optional function	remote ON/OFF control, line drop compensation, peak current output, output failure alarm			
weight (typical)	900 g			
dimension	199×99×52 mm (L×W×H)			

Note:

*1 All parameters not specially mentioned are measured at 115/230VAC input, rated load and 25°C of ambient temperature.
*2 Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
*3 OCP type: constant current limiting, recovers automatically after fault condition is removed (hiccup mode customizable)
*4 OVP type: shutdown output voltage, re-power on to recover.
*5 The power supply is considered as a component to be installed into a final equipment which should be re-confirmed to meets EMC directives..

Mechanical Outline (unit: mm)

Model: MF320A



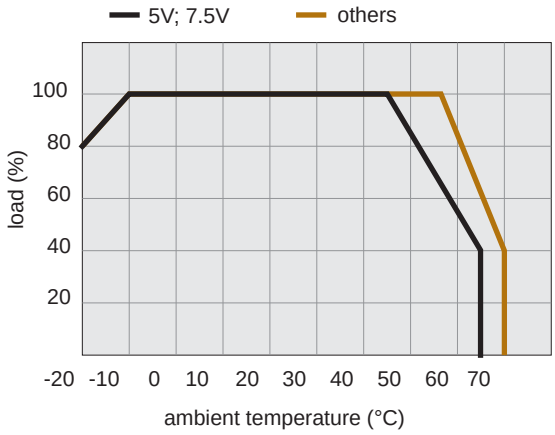
- Terminal Pin No. Assignment

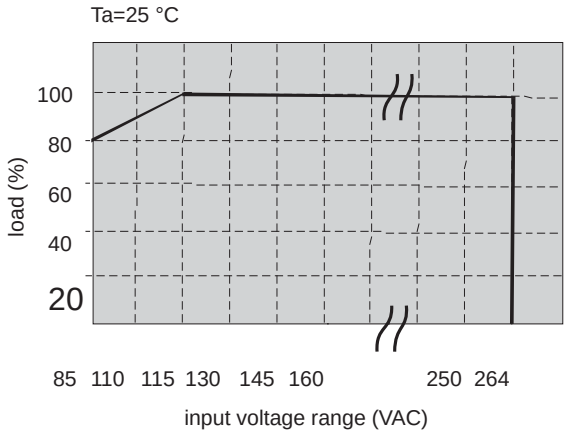
pin no.	assignment
1	AC input / L
2	AC input / N
3	FG ⏚
4, 5	DC output -V
6, 7	DC output +V

- CN3: JST S8B_PHDSS or equivalent (optional)

pin no.	assignment	pin no.	assignment
1	COM	8	PF
2	RC+	7	RC-
3	VO-	6	-S
4	VO+	5	+S

Derating Curve





◇ RC-880 Regeneration Clamp

Many motor and drive systems require a clamp circuit to limit increases in power supply voltage when the motor is decelerating under load. This is commonly referred to as “regeneration”, and occurs when DC motors are driven by their load (backdriving). During regeneration the DC motor can produce enough voltage to actually exceed the input power supply voltage. MOONS' drives can deal with regeneration by channeling the increased motor voltage back to the source power supply. However, if the voltage is not clamped to a safe level the power supply and/or drive can be damaged or destroyed.

Max. Supply Voltage: 80V DC

Max. Output Current: 8A(rms)

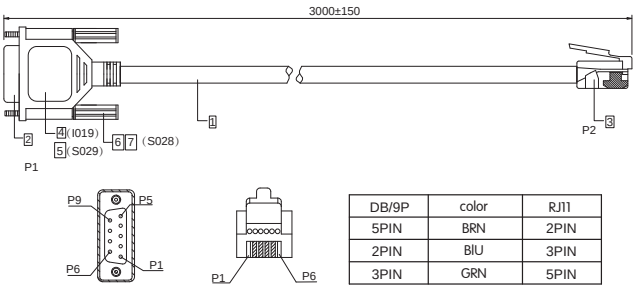
Continuous Power: 50W

Cables

Communication Cable

Model: 2001-300

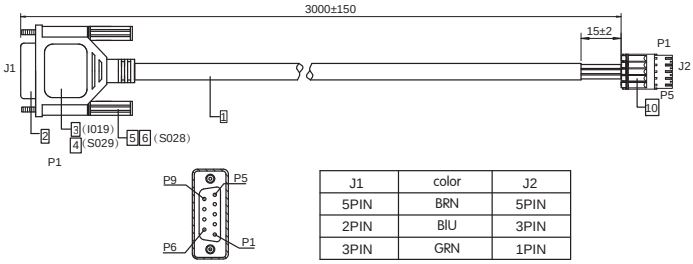
Description: General RS-232 communication cable



DB/9P	color	RJ11
5PIN	BRN	2PIN
2PIN	BlU	3PIN
3PIN	GRN	5PIN

Model: 2002-300

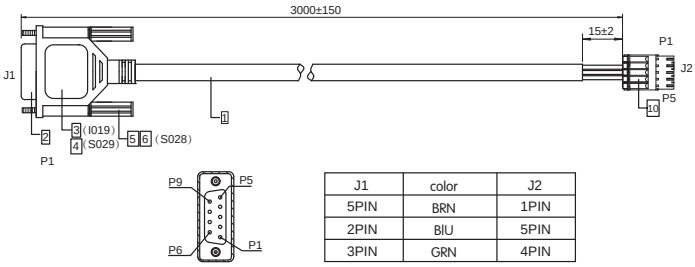
Description: STM17/SSM17-S/Q type RS-232 communication cable



J1	color	J2
5PIN	BRN	5PIN
2PIN	BlU	3PIN
3PIN	GRN	1PIN

Model: 2003-300

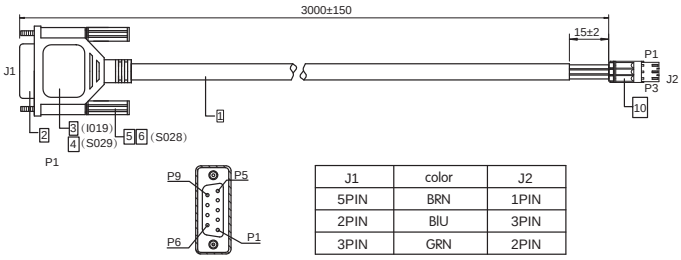
Description: STM17/SSM17-CANopen type configutaion cable



J1	color	J2
5PIN	BRN	1PIN
2PIN	BlU	5PIN
3PIN	GRN	4PIN

Model: 2004-300

Description: STM23/24. SSM23/24, -CANopen type configutaion cable

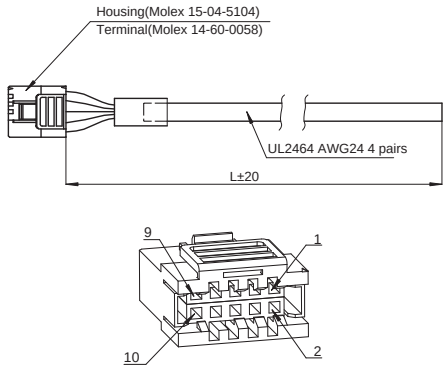


J1	color	J2
5PIN	BRN	1PIN
2PIN	BlU	3PIN
3PIN	GRN	2PIN

Encoder Cable

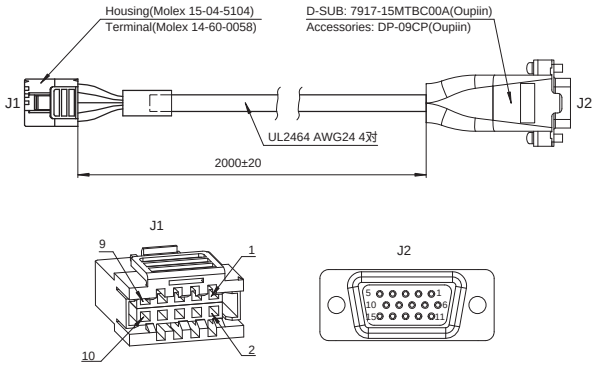
P/N	Length
1001-100	2m
1009-500	5m

Description: General encoder Cable



Pin.	Signal	Color
1	NC	
2	Ground	GRN/WHT
3	I-	ORG/WHT
4	I+	ORG
5	A-	BLU/WHT
6	A+	BLU
7	Power+	GRN
8	NC	
9	B-	BRN/WHT
10	B+	BRN

Model: 2005-200
Description: Encoder cable used with MOONS' drive



J1	Signal	J2	Color
1	NC		
2	Ground	8	GRN/WHT
3	I-	6	ORG/WHT
4	I+	5	ORG
5	A-	2	BLU/WHT
6	A+	1	BLU
7	Power+	7	GRN
8	NC		
9	B-	4	BRN/WHT
10	B+	3	BRN

USB Converter

Model: MS-USB-RS232-01
Description: USB-RS232 converter

Model: MS-USB-RS485-01
Description: USB-RS485 converter

Model: MS-USB-CAN-01
Description: USB-CAN converter

Appendix

SOFTWARE

Advanced
Application Software
Solutions

Ease Of Setup is Our Priority

Our goal is to make the setup & programming of motion control systems as easy as possible. We have all the software tools needed to setup, calibrate, and configure your MOONS' system. All software downloads and updates are provided to our customers at no charge.

Step-Servo Quick Tuner

Used for setup and configuration of the Step-Servo products. It also helps to achieve fine servo tuning and test basic motion as well as data monitoring.

ST Configurator

Used for setup and configuration with the ST/STAC drives and STM/SWM integrated motors. ST Configurator gives an easy path to setting all the drive parameters.

Q Programmer

Used to create and edit stand-alone programs for Q-compatible drives. The functions of these drives include multi-tasking, math, register manipulation, encoder following, and more.

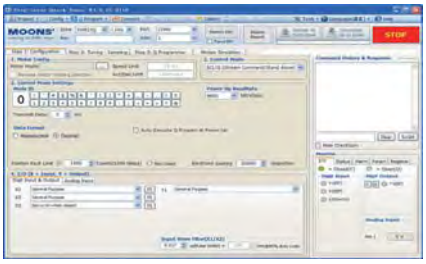
RS485 Bus Utility

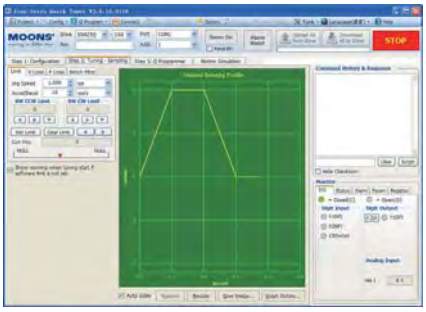
The RS485 Bus Utility is an easy and powerful terminal to setup and test a multi-axis network via MOONS' SCL ASCII stream commands.

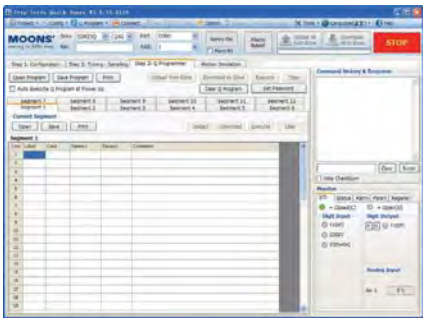
CANopen Test Tool

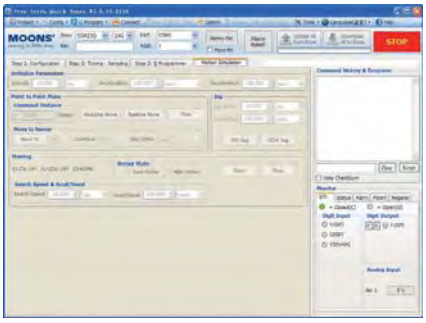
Testing CANopen communication, it helps you to develop and analysis your CANopen motion control with easy.

Step-Servo Quick Tuner









Software Features

- Friendly Interface
- Easy setup within just three steps
- Drive setup and configuration
- Servo Tuning and Sampling
- Built-in Q Programmer to create and edit stand-alone programs for Q-compatible drivers
- Motion testing and monitoring
- Write and save SCL command scripts
- Online help integrated
- Support all **Step-Servo** products in TSM/SSM/TXM/SS Series

About this software

Step-Servo Quick Tuner is the PC based software application used to configure, and perform servo tuning, drive testing and evaluation of the **Step-Servo**. System servo control gains, drive functionality, and I/O configuration are set with **Step-Servo** Quick Tuner. It also contains an oscilloscope function to help set the servo control gains. The **Step-Servo** Quick Tuner provides seamless communication with all models whether they have RS-232, RS-485, CANopen or Ethernet communications.

System Requirements

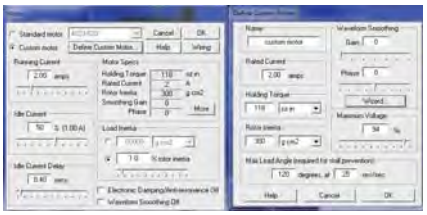
Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

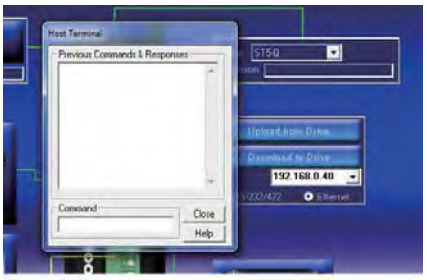
FREE DOWNLOAD

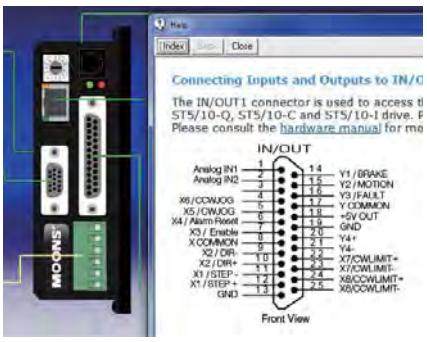
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

ST Configurator







Software Features

- Intuitive interface
- Drive status and alarm monitoring
- Self-test function to test drive/motor operation
- Built-in SCL Terminal
- Online help integrated
- Supports all ST and STAC stepper drives
- Supports all STM and SWM integrated steppers

About this software

The ST Configurator software makes setting up, configuring and programming ST, STAC and STM stepper drives a snap. All motor, I/O, encoder and motion control parameters are available to the user through an intuitive interface. The ST Configurator provides seamless communication with all models whether they have RS-232, RS-485, CANopen or Ethernet communications. It also includes a built-in Q Programmer so you can switch context quickly and easily.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

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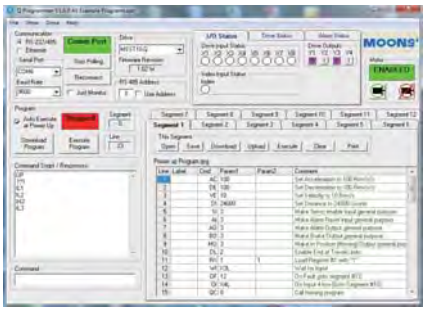
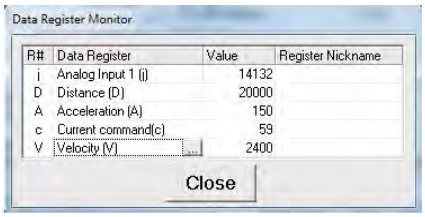
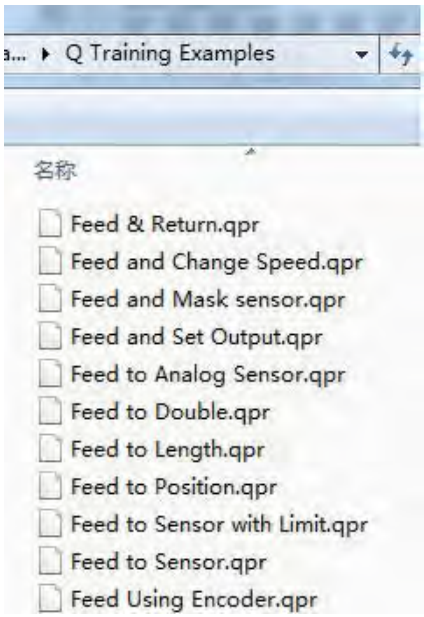
Q Programmer







Software Features

- Single-axis motion control
- Stored program execution
- Multi-tasking
- Conditional processing
- Math functions
- Data registers
- Motion Profile simulation
- Online help integrated
- Support all Q/C/IP Types drive in SS/ST/STAC Series
- Support all Q/C/IP Types Integrated Motors in TSM/SSM/TXM/STM/SWM Series

About this software

Q Programmer is a single-axis motion control software for programmable stepper and servo drives from MOONS'. The software allows users to create sophisticated and functional programs that Q and Plus drives can run stand-alone. The commands available in the Q programming environment consist of commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

FREE DOWNLOAD
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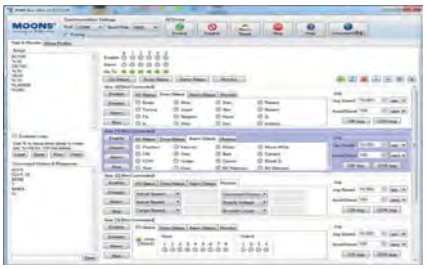
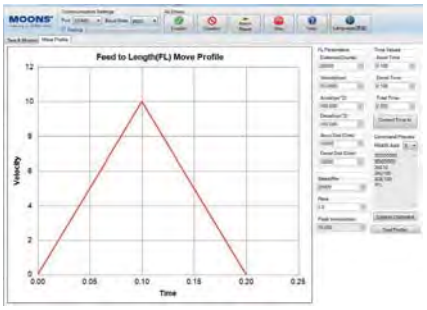
www.moonsindustries.com

RS485 Bus Utility





Software Features

- Stream SCL commands from the command line
- Simple interface with powerful capability
- Easy setup with RS-485 for 32 axis network motion control
- Monitoring Status of I/O, drive, alarm and the other nine most useful motion parameters
- Write and save SCL command scripts
- Online help integrated
- Supports all RS-485 drives

About this software

If you plan to stream serial commands to MOONS' drive using the Serial Command Language (SCL), to build an RS-485 multi-axis network, you'll need a simple terminal emulator to get familiar with and test your command strings and test the network. RS-485 Bus Utility is the ideal choice because it sends command strings as a packet, with minimal delay between characters, and properly terminated with a carriage return. Other terminal applications send each character as it's typed, making them difficult to use with SCL commands.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

FREE DOWNLOAD
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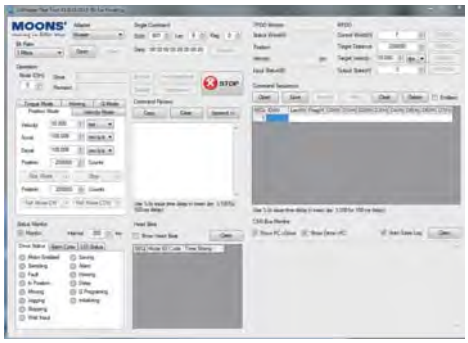
www.moonsindustries.com

CANopen Test Tool



Software Features

- Friendly User Interface
- Multiple operation Mode Support
- Multi-Thread, High Performance
- CAN bus monitor and log function
- Kvaser/PEAK/ZLG adapter support

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

Glossary

Absolute Position
Position referenced to a fixed zero or "home" position

Absolute Programming
A positioning coordinate reference wherein all positions are specified relative to some reference or "home" position; this is different from incremental programming where distances are specified relative to the current position

Ambient Temperature
The temperature of the medium immediately surrounding a device

Amplifier
Electronic device that converts command signals (analog or digital) to high power voltages and currents for the operation of the motor

ASCII
American Standard Code for Information Interchange; this code assigns a number to each numeral and letter of the alphabet allowing information to be transmitted between machines as a series of binary numbers

Axial Play(End play)
The axial shaft displacement due to a reversal of an axial force on the shaft

Baud Rate
The number of binary bits transmitted per second for serial communications such as RS-232

Bi-level Drive (Dual Voltage Drive)
A driver where two levels of voltage are used to drive a step motor; a high (over drive) voltage is applied to the winding each time it is switched on; the high voltage stays on until the current reaches a predetermined level; the high voltage is turned off after a time period determined experimentally or by sensing winding current; the low voltage maintains the desired current

Bipolar Drive
A drive that reverses the magnetic polarity of a pole by electronically switching the polarity of the current to the winding (+ or -); bipolar drives can be used with 4, 6, or 8 lead motors; with 4 and 8 lead motors, bipolar drives are usually more efficient than unipolar drives and generally produce more torque

Brushless Servo Drive
A servo drive used to control a permanent magnet synchronous AC motor

Chopper Drive
A step motor drive that uses switching amplifiers to control motor current

Class B Insulation
Specifies motor insulation that is rated for operation up to 130°C

Class H Insulation
Specifies motor insulation that is rated for operation up to 180°C

Closed Loop
A system that uses some form of feedback device to monitor the system output; the signal from the device is used to correct any errors between actual and demanded output

Cogging
Term used to describe uneven velocity in motors usually at low speeds

Commutation
Refers to the action of steering currents or voltage to the proper motor phases to produce optimum motor torque. In brush type motors, commutation is done electromechanically via the brushes and commutator. In brushless motors, commutation is done by the switching electronics using rotor position information typically obtained from hall sensors, tachometers, resolvers or encoders.

Controller (Step Motor)
A system consisting of a DC power supply and power switches plus associated circuits to control the switches in the proper sequence

Damping
An indication of the rate of decay of a signal to its steady state value; related to settling time

Dead Band
A range of input signals for which there is no system response

Detent Torque
The maximum torque required to slowly rotate a step motor shaft with no power applied to the windings; this applies only to permanent magnet or hybrid motors; the leads are separated from each other

Drive (PWM)
A motor drive utilizing Pulse-Width Modulation techniques to control current to the motor; typically a high efficiency drive that can be used for high response applications

Drive (Servo)
A motor drive that utilizes motor position feedback with a control loop for accurate control of motor position and/or velocity

Drive (Stepper)
An electronic package to convert digital step and direction inputs to currents to drive a step motor

Duty Cycle
The percentage of ON time vs. OFF time; a device that is always on has a 100% duty cycle; half on and half off is a 50% duty cycle

Dynamic Braking
A passive technique for stopping a permanent magnet brush or brushless motor; the motor windings are shorted together through a resistor, which results in a motor braking with an exponential decrease in speed

Encoder
A device used to translate motion into electrical signals used to provide position information; often used as a position/motion feedback device in closed loop systems

Encoder Marker Pulse
A once-per-revolution signal that is provided by some incremental encoders to specify a reference point within that revolution

End Play
The axial shaft motion due to the reversal of an axial force acting on a shaft with axial clearance or low axial pre-load

Following Error
The positional error during motion between a load's actual position and the commanded position

Friction - Coulomb
A resistance to motion between non-lubricated surfaces; this force remains constant with velocity

Friction - Viscous
A resistance to motion between lubricated surfaces; this force is proportional to the relative velocity between the surfaces

Hall Sensors
A feedback device built into a motor used by a servo amplifier to electronically commutate the motor

Holding Torque (Static Torque)
The maximum restoring torque that is developed by the energized motor when the shaft is slowly rotated by external means

Hybrid Step Motor
A type of step motor comprising a permanent magnet and variable reluctance stator and rotor structures; it uses a double salient pole construction

Hysteresis (Positional)
The difference between the step positions when moving CW and the step position when moving

CCW; a step motor may stop slightly short of the true position thus producing a slight difference in position CW to CCW

I/O (Inputs/Outputs)
The reception and transmission of information between control devices; I/O has two distinct forms: Digital - switches, relays, etc. which are either in an On or Off state; Analog – a continuous signal such as speed, temperature, low, etc.

Idle Current Reduction
Reduction of phase current to a step motor when no motion is required

Indexer
An electronic control device that sends pulse and direction signals for use by a step motor driver

Inductance (Mutual)
The property that exists between two current carrying conductors or coils when magnetic lines of flux from one link with those of the other

Inductance (Self)
The constant by which the rate of change of the coil current must be multiplied to give the self-induced counter EMF

Inertia
Measure of resistance of an object to changes in velocity; the larger the inertia, the more torque required to accelerate and decelerate the load

Inertial Match
Ratio of reflected load inertia to motor inertia

Instantaneous START/STOP Rate
The maximum switching rate that an unloaded step motor will follow without missing steps when starting from rest or stopping from moving

L/R Drive
A drive that uses external resistance to allow a higher voltage than that of a voltage drive; L/R drives have better performance than voltage drives, but have less performance and efficiency than a chopper drive

Loop, PID
A high performance control loop that uses Proportional, Integral and Derivative type control parameters

Loop, Position
A feedback control loop in which the controlled parameter is motor position

Loop, Velocity
A feedback control loop in which the controlled parameter is velocity

Maximum Reversing Rate
The maximum stepping rate at which an unloaded motor will reverse direction of rotation without missing steps

Maximum Slew Rate
The maximum stepping rate at which a step motor with no load will run and remain in synchronism

Microstepping
A technique in which motor steps are electronically divided by the drive into smaller steps; the most common microstep resolutions are 10, 25 and 50 steps per full step, but many resolutions ranging from 2 to 256 microsteps per full step are available

Open Frame Drive
Refers to amplifiers where a separate DC power source must be provided to the unit

Open-Loop
A system with no feedback; most step motor systems are run in this mode

Oscillator
A device that is used to produce pulses for driving a step motor at a preset speed

Overshoot
The amount a motor shaft rotates beyond the commanded stopping position

Packaged Drive
Refers to amplifiers where the power supply is included in the enclosure and 110/220VAC is used to power the unit

Permanent Magnet Step Motor
A step motor having a permanent magnet rotor and wound stator

Pull-In Rate (Response Rate)
The maximum switching rate at which an unloaded motor can start without losing step positions.

Pull-In Torque
The maximum torque load at which a step motor will start and run in synchronism with a fixed frequency stepping rate without losing step positions

Pull-out Torque
The maximum torque load that can be applied to a motor running at a fixed stepping rate while maintaining synchronism; any additional load torque will cause the motor to stall or miss steps

Pulse Rate
The rate at which successive steps are initiated or the windings switched; the pulse rate divided by the resolution of the motor/drive combination (in steps per revolution) equals the rotational speed of the motor in revolutions per second

PWM (Pulse Width Modulation)
A method of controlling motor voltage and current used in servo and step motor drivers

Radial Play (Side play)
The side-to-side movement of the shaft due to clearances between the shaft and bearing, bearing to housing, and bearing internal clearance for ball and roller bearings

Ramping
The acceleration and deceleration of a motor; may also refer to the change in frequency of the step pulse train

Rated Torque
The torque producing capability of a motor at a given speed; this is the maximum continuous torque the motor can deliver to a load

Regeneration
The action during deceleration, in which the motor acts as a generator and takes kinetic energy from the load, converts it to electrical energy, and returns it to the amplifier

Repeatability
The degree to which the positioning accuracy for a given move performed repetitively can be duplicated

Resolution
The smallest positioning increment that can be achieved; frequently defined as the number of steps or feedback units required for a motor's shaft to rotate one complete revolution

Resonance
The effect of a periodic driving force that causes a large amplitude increase at a particular frequency

Response Rate (Pull-In Rate)
The stepping rate an unloaded motor can follow from a standing start without missing steps

Ringing
Oscillation of a system following a sudden change in state

RS-232, RS-422/485
Serial communication hardware definitions

Serial Port
A digital data communications port that uses a serial bit stream for data transfer

Servo Amplifier/Servo Drive
An electronic device that converts a control signal into a current that is fed into the motor windings to produce torque in the motor

Servo System
A feedback control system for mechanical motion in which the controlled output is position or velocity; servo systems are closed loop systems

Settling Time
The elapsed time starting the instant the rotor reaches the commanded step position and the oscillations settle to within a specified displacement band around the final position

Si
MOONS' Simple Indexer operating environment; sequences for machine operation are programmed by the use of point and click instructions

Slew
The portion of a move made at a constant non-zero velocity

Stall Torque (holding or static)
The torque available from a motor at stall or zero rpm

Step Angle
The nominal angle through which the step motor shaft rotates between adjacent step positions

Step or Stepping Rate (Speed)
The number of steps a shaft rotates during a specified time interval

Step-to-step Accuracy (relative accuracy)
The maximum error that occurs between any adjacent step, expressed as a percentage of one full step

Switching Amplifier
A device that switches a high voltage on and off to control current; some amplifiers (PWM types) switch at a constant frequency and adjust duty cycle to control current, others have a fixed off time and adjust the frequency

Switching Sequence (Energizing Sequence)
The sequence and polarity of voltages applied to coils of a step motor that result in a specified direction of rotation

Thermal Time Constant
The time required for the motor winding to reach 63.2% of its final temperature

Thermal Resistance
The resistance to the flow of energy between two surfaces of the same body or different bodies; thermal resistance = degrees C/watt in the winding

Torque
The rotary equivalent of force; equal to the product of the force perpendicular to the radius of motion and distance from the center of rotation to the point where the force is applied

Torque Constant
A number representing the relationship between motor input current and motor output torque, usually expressed in units of torque/amp

Torque Displacement Curve
The holding (restoring) torque plotted as a function of rotor angular displacement with the motor energized

Torque Gradient (Stiffness)
The ratio of the change in holding torque to a particular change in shaft position when the motor is energized

Torque Ripple
The cyclical variation of generated torque given by the product of motor angular velocity and number of commutator segments

Torque-to-inertia Ratio
Ratio of a motor's torque divided by the motor's rotor inertia; the higher the ratio, the higher the acceleration may be

Unipolar Drive
The motor phase winding current is switched in one direction only; the polarity of the applied voltage to each winding is always the same; unipolar drives require 6 or 8 lead motors

Variable Reluctance Step Motor (V/R)
A step motor having a wound stator or stators with salient poles working with a soft iron rotor having salient poles on the periphery

Velocity
The change in position as a function of time; velocity has both magnitude and direction

Viscous Damping
A damper that provides a drag or friction torque proportional to acceleration; a quality used to damp unwanted oscillations of a step motor

Voltage Drive
A drive operated at the minimum voltage required to safely limit motor current; motors used with voltage drives produce less torque at higher speeds than when used with L/R or chopper drives

Wave Drive
Energizing the phases one at a time; driving the motor one phase or winding at a time

Inertia Conversion Tables

To convert from A to B multiply by entry in table.

AB	lb-ft^2	lb-ft-s^2 or slug-ft^2	lb-in^2	lb-in-s^2	oz-in^2	oz-in-s^2	Kg-m^2	g-cm^2	g-cm-s^2
lb-ft^2	1	3.108×10^{-2}	144	0.373	2.304×10^{3}	5.968	4.214022×10^{-2}	4.214×10^{5}	429.71
lb-ft-s^2	32.174	1	4.633×10^{3}	12	7.413×10^{4}	192	1.35582	1.356×10^{7}	1.383×10^{4}
lb-in^2	6.944×10^{-3}	2.158×10^{-4}	1	2.509×10^{-3}	16	4.144×10^{-2}	2.926404×10^{-4}	2.926×10^{3}	2.984
lb-in-s^2	2.681	8.333×10^{-2}	386.1	1	6.177×10^{3}	16	1.12985×10^{-1}	1.130×10^{6}	1.152×10^{3}
oz-in^2	4.34×10^{-4}	1.349×10^{-5}	6.25×10^{-2}	1.619×10^{-4}	1	2.59×10^{-3}	1.829006×10^{-5}	182.901	0.186
oz-in-s^2	0.168	5.208×10^{-3}	24.13	6.25×10^{-2}	386.088	1	7.06155×10^{-3}	7.0616×10^{4}	72.008
Kg-m^2	23.73	0.73756	3,417.16	8.85073	54,674.5	141.6	1	1×10^{7}	10,197.2
g-cm^2	2.373×10^{-6}	7.376×10^{-8}	3.417×10^{-4}	8.851×10^{-7}	5.467×10^{-3}	1.416×10^{-5}	1×10^{-7}	1	1.0197×10^{-3}
g-cm-s^2	2.327×10^{-3}	7.233×10^{-5}	0.3351	8.680×10^{-4}	5.362	1.389×10^{-2}	9.806614×10^{-5}	980.667	1

Example: Convert a rotor inertia of 90 g-cm^2 to oz-in-s^2
The multiplier from the table above is 1.416×10^{-5}
The new inertia is $90 \times 1.416 \times 10^{-5} = 1.27 \times 10^{-3}$oz-in-sec^2

Torque Conversion Tables

To convert from A to B multiply by entry in table.

AB	lb-ft	lb-in	Oz-in	dyne-cm	N-m	mN-m	Kgm	g-cm
lb-ft	1	12	192	1.356×10^{7}	1.356	1.356×10^{3}	0.1383	1.383×10^{4}
lb-in	8.333×10^{-2}	1	16	1.130×10^{6}	0.113	1.13×10^{2}	1.152×10^{-2}	1.152×10^{3}
Oz-in	5.208×10^{-3}	6.250×10^{-2}	1	7.062×10^{4}	7.062×10^{-3}	7.062	7.201×10^{-4}	72.01
dyne-cm	7.376×10^{-8}	8.851×10^{-7}	1.416×10^{-5}	1	10^{-7}	10^{-4}	1.0197×10^{-8}	1.0197×10^{-3}
N-m	0.7376	8.851	141.62	10^{7}	1	1,000	0.10197	1.0197×10^{4}
mN-m	7.376×10^{-4}	8.851×10^{-3}	0.1416	10^{4}	10^{-3}	1	1.0197×10^{-2}	10.197
Kgm	7.233	86.796	1.389×10^{3}	9.8067×10^{7}	9.8066	9806.6	1	10^{5}
g-cm	7.233×10^{-5}	8.6801×10^{-4}	1.389×10^{-2}	980.67	9.8066×10^{-5}	9.8066×10^{-2}	10^{-5}	1

Example: Convert a torque of 53 oz-in to kg-cm
The multiplier from the table above is 7.201×10^{-2}
The new torque value is $53 \times 7.201 \times 10^{-2} = 3.816$kg-cm

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